New Hampshire Regional Haze Plan Periodic Comprehensive Revision

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NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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New Hampshire Regional Haze Plan Periodic Comprehensive Revision

Prepared by

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ACRONYMS AND ABBREVIATIONS

$\mu g/m^3$	Microgram per cubic meter
AERR	Air Emissions Reporting Requirements
AMPD	Air Markets Program Data
BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
BenMAP	Benefits Mapping and Analysis Program
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CALPUFF	California Puff
CAMD	Clean Air Markets Division
CASTNET	Clean Air Status and Trends Network
CEMS	Continuous Emission Monitoring System
CenRAP	Central Regional Air Planning Association
CENSARA	Central States Air Resource Agencies
CFR	Code of Federal Regulations
CSAPR	Cross State Air Pollution Rule
CT DEEP	Connecticut Department of Energy and Environmental Protection
DLN	Dry low NOx
DOE	U.S. Department of Energy
dscm	Dry stand cubic meter
DSI	Dry Sorbent Injection
dv	Deciview
EGU	Electric Generating Unit
EIS	Emissions Inventory System
EPA	United States Environmental Protection Agency
ESP	Electrostatic Precipitator
FED	Federal Land Manager Environmental Database
FGD	Flue Gas Desulfurization
FGR	Flue gas recirculation
FLM	Federal Land Managers
GHGER	Greenhouse Gas Emission Reduction
GRGU	Great Gulf Wilderness Area
HYSPLIT	Hybrid Single-Particle Lagrangian Integrated Trajectory
IC	Internal Combustion
ICI	Industrial/Commercial/ Institutional
IMPROVE	Interagency Monitoring of Protected Visual Environments
km	Kilometer
LADCO	Lake Michigan Air Directors Consortium
LAER	Lowest Available Emission Rate
LNB	Low NOx Burner
LTS	Long-term strategy
MATS	Mercury and Air Toxics Standards
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
ME DEP	Maine Department of Environmental Protection
Mm^{-1}	Inverse Megameter
MMBtu	1,000,000 British thermal units
MOVES	Motor Vehicle Emissions Simulator
MRPO	Midwest Regional Planning Organization

MW	Megawatt
MWC	Municipal Waste Combustion
NAAQS	National Ambient Air Quality Standards
NACAA	National Association of Clean Air Agencies
NEI	National Emissions Inventory
NESCAUM	Northeast States for Coordinated Air Use Management
NH_3	Ammonia
NHDES	New Hampshire Department of Environmental Services
NNSR	Nonattainment New Source Review
NO_3	Nitrate
NO_x	Oxides of Nitrogen
O_2	Oxygen
OFA	Overfire Air
OTC	Ozone Transport Commission
PAG	Policy Advisory Group
PM	Particulate Matter
$PM_{2.5}$	Fine Particulate Matter (particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers)
PM_{10}	Course Particulate Matter (particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers)
ppm	Parts per million
ppmvd	Parts per million by volume on a dry basis
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RBLC	RACT/BACT/LAER Clearinghouse
RGGI	Regional Greenhouse Gas Initiative
RPG	Reasonable Progress Goal
RPO	Regional Planning Organization
RPS	Renewable Portfolio Standard
RSA	Revised Statutes Annotated
SESARM	Southeastern Air Pollution Control Agencies
SCR	Selective Catalytic Reduction
SIP	State Implementation Plan
SNCR	Selective Noncatalytic Reduction
SO_2	Sulfur Dioxide
SO_4	Sulfate
STN	Speciation Trends Network
tpy	tons per year
TSC	Technical Support Committee
URP	Uniform Rate of Progress
U.S.C.	United States Code
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	Volatile Organic Compounds
VT DEC	Vermont Department of Environmental Conservation
WMNF	White Mountain National Forest
WRAP	Western Regional Air Partnership
WSARC	Western States Air Resources Council

FOREWORD

This document fulfills U.S. Environmental Protection Agency's (EPA's) Regional Haze Rule 40 CFR §51.308(f) provision for the second implementation period (2018-2028) to identify, for each in-state Federal Class I area: a) baseline, current and natural visibility conditions for the 20% most impaired days and the 20% clearest days; b) the State's long-term strategy (LTS) to address regional haze for each in-state Federal Class I area and each Federal Class I area outside the State that may be affected by emissions from the State; c) reasonable progress goals (RPGs) for attaining the visibility conditions that are projected to be achieved by the end of the implementation period; and d) an assessment of the current monitoring strategy. This document also contains elements to fulfill progress report requirements contained in §51.308(g).

The Federal Class I areas that are addressed in this document are listed below along with the larger Federal area within which they are embedded:

MANE-VU Class I Areas

Acadia National Park, ME
Moosehorn Wilderness Area, ME (Moosehorn National Wildlife Refuge)
Roosevelt Campobello International Park, NB Canada
Great Gulf Wilderness Area, NH (White Mountain National Forest)
Presidential Range-Dry River Wilderness Area, NH (White Mountain National Forest)
Brigantine Wilderness Area, NJ (E.B. Forsythe National Wildlife Refuge)
Lye Brook Wilderness (Green Mountain National Forest)

Nearby Class I Areas

James River Face, VA (George Washington and Jefferson National Forests)
Shenandoah National Park, VA
Dolly Sods, WV (Monongahela National Forest)
Otter Creek, WV (Monongahela National Forest)

EXECUTIVE SUMMARY

Section 169A of the Clean Air Act (CAA) provides for the protection of visibility at mandatory Federal Class I areas. These designated areas include 156 national parks and wilderness areas located throughout the United States. Regional haze obscures vistas that are integral to the value of such areas. In 1999, the EPA adopted the Regional Haze Rule (published at 64 FR 35714 and codified at 40 CFR §§51.300-309), which calls for state, tribal and federal agencies to work together to improve visibility in all Federal Class I areas. Two of these areas – Great Gulf Wilderness Area and Presidential Range-Dry River Wilderness Area – are located in New Hampshire's White Mountain National Forest (WMNF).

This document fulfills the EPA's Regional Haze Rule §51.308(f) provision for the second implementation period (2018-2028) to identify, for each Federal Class I area within the State: a) baseline, current and natural visibility conditions for the 20% most impaired days and the 20% clearest days; b) the State's LTS to address regional haze for each in-state Federal Class I area and each Federal Class I area outside the State that may be affected by emissions from the State; c) RPGs for attaining the visibility conditions that are projected to be achieved by the end of the implementation period; and d) an assessment of the current monitoring strategy. This document also fulfills the Regional Haze Rule §51.308(g) requirement by serving as the second progress report for the first implementation period (2008-2018).

New Hampshire has fulfilled the LTS goals expressed in its EPA-approved Regional Haze State Implementation Plan (SIP) submission [77 FR 50602] and subsequent progress report [81 FR 70360] for the first planning period (2008 – 2018) by:

- The timely implementation of Best Available Retrofit Technology (BART) requirements at targeted electric generating units (EGUs) codified at New Hampshire's Code of Administrative Rules Env-A 2300, *Mitigation of Regional Haze*.
- Implementing a statewide ultra-low sulfur fuel oil requirement (RSA 125-C:10-d, *Sulfur Limits of Certain Liquid Fuels*).
- Requiring emission controls at targeted EGUs (RSA 125-O, *Multiple Pollutant Reduction Program*).
- Continued evaluation of other control measures such as expanding the use of alternative clean fuels, increasing energy efficiency, and further reducing emissions from coal and wood combustion.

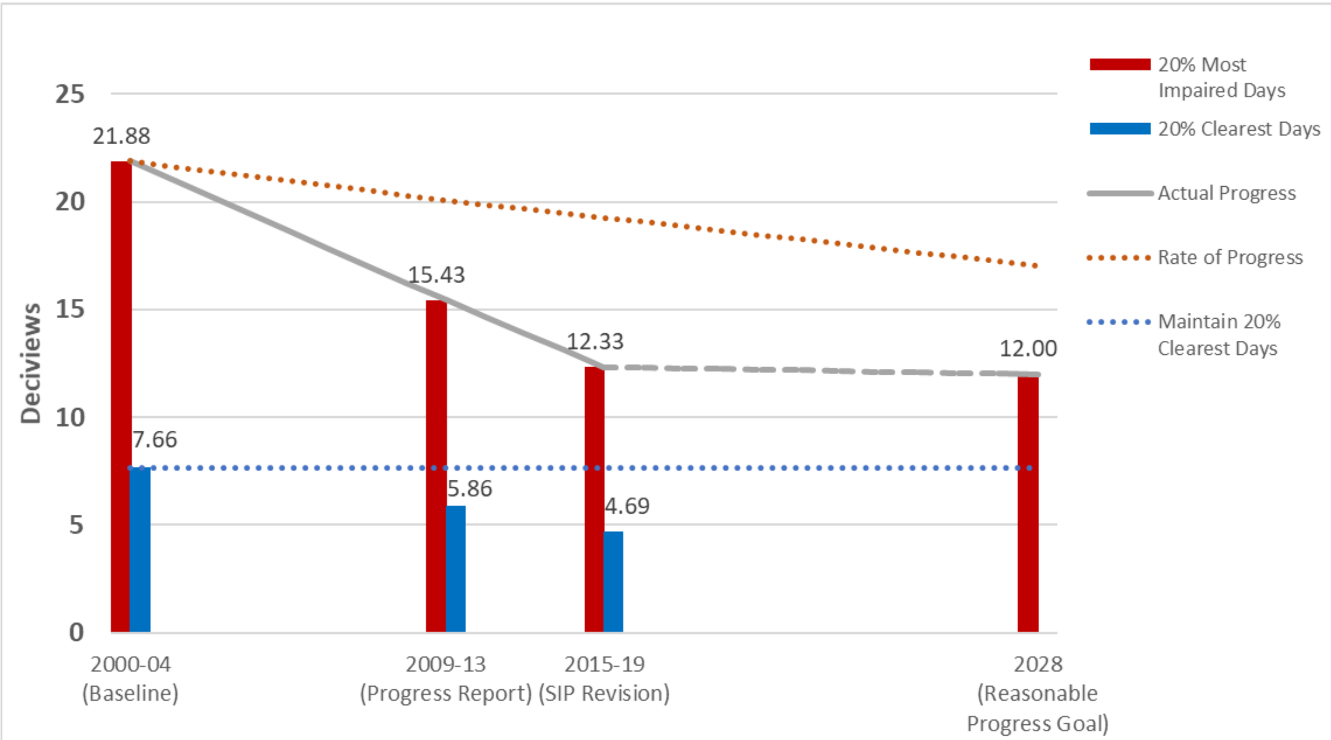
Visibility trends analyses in this document used EPA-recommended metrics in the December 2018 technical guidance (EPA's 2018 Technical Guidance) at Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring sites at Federal Class I areas in and adjacent to the Mid-Atlantic/Northeast Visibility Union (MANE-VU)[1] region. This document provides an analysis of visibility data collected at the IMPROVE monitoring site representing New Hampshire's Class I areas, starting in the baseline period of 2000-2004[2] through 2015-2019, the most recent five-year period with available data. The results of this analysis show a definite reduction in overall haze levels at New Hampshire's Class I areas and corresponding rate of improvement better than the 2028 uniform rate of progress (URP) visibility condition for the 20% most impaired visibility days, as shown in Figure E-1.

[1] MANE-VU includes the following member states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and the District of Columbia.

[2] The Great Gulf IMPROVE data for 2000 was incomplete thus, the baseline was calculated for the 4-year period of 2001-2004.

This SIP revision will demonstrate New Hampshire and the MANE-VU region's additional progress, and establish RPGs and a LTS for improving the 20% most impaired visibility days through the next planning cycle (2018-2028) and for attaining natural background levels by 2064. The Regional Haze Rule also specifies that the 20% clearest days be maintained (or improved) through 2064.

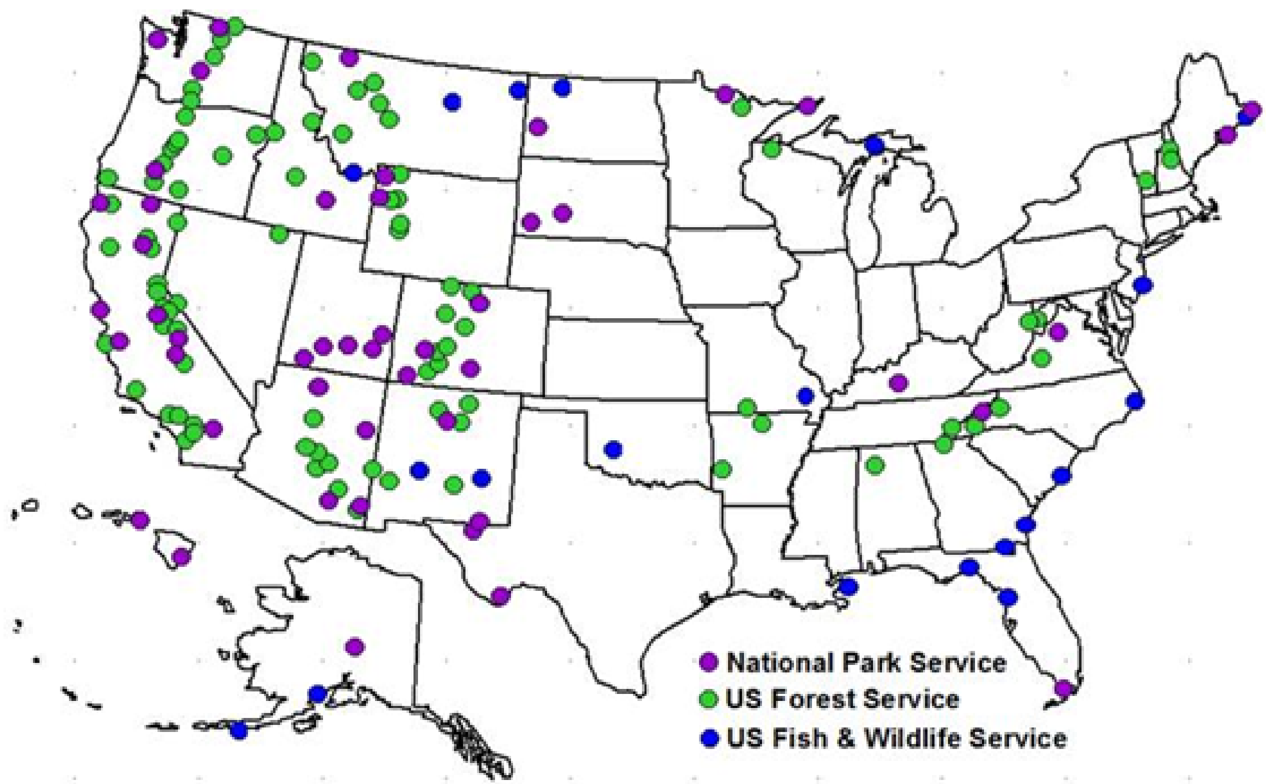
Figure E-1: Visibility Trends at Great Gulf and Presidential Range - Dry River Wilderness Areas



1 THE REGIONAL HAZE ISSUE

In 1999, the EPA issued regulations to improve visibility in 156 national parks and wilderness areas across the United States. The affected areas include many of our best-known natural places, including the Grand Canyon, Yosemite, Yellowstone, Mount Rainier, Shenandoah, the Great Smoky Mountains, Acadia, and the Everglades (Figure 1-1). In New Hampshire, the areas are the Great Gulf Wilderness and the Presidential Range - Dry River Wilderness.

Figure 1-1: Locations of Federally Protected Mandatory Class I Areas



These regulations address visibility impairment in the form of regional haze. Haze is an atmospheric phenomenon that obscures the clarity, color, texture, and form of what we see. It is caused primarily by anthropogenic (manmade) pollutants but can also be caused by a number of natural phenomena, including forest fires, dust storms and sea spray. Some haze-causing pollutants are emitted directly to the atmosphere by anthropogenic emission sources such as electric power plants, factories, automobiles, construction activities, and agricultural burning. Others occur when gases emitted into the air (haze precursors) interact to form new particles that are carried downwind.

Emissions from these activities generally span broad geographic areas and can be transported hundreds or thousands of miles. Consequently, regional haze occurs in every part of the nation. Because of the regional nature of haze, EPA's regulations require the states to consult with one another toward the national goal of improving visibility – specifically, at the 156 parks and wilderness areas designated under the CAA as mandatory Federal Class I areas.

EPA regional haze regulations found at 40 CFR §51.308 identify the core requirements for addressing the haze phenomenon in each mandatory Federal Class I area located within the State and each Federal Class I area outside of the State that may be affected by emissions from within the State. These plans must take the form of a SIP revision and are to be updated in 10-year increments, starting July 31, 2018. New Hampshire submitted its initial Regional Haze Plan on January 29, 2010. It was approved by the EPA on August 22, 2012 [77 FR 50602]. EPA amended its requirements for state plans in 2017 [82 FR 3078], including extending the deadline at 40 CFR §51.308(f) for comprehensive SIP revisions from July 31, 2018 to July 31, 2021.

1.1 Basics of Regional Haze

Small particles and certain gaseous molecules in the atmosphere cause poor visibility by scattering and absorbing light, reducing the amount of visual information about distant objects that reaches an observer. Some light scattering by air molecules and naturally occurring aerosols occurs even under natural conditions. The distribution of particles in the atmosphere depends on meteorological conditions and leads to various forms of visibility impairment. When high concentrations of pollutants are well mixed in the atmosphere, they form a uniform haze. When temperature inversions trap pollutants near the surface, the result can be a sharply demarcated layer of haze.

Visibility impairment can be quantified using three different, but mathematically related measures: light extinction per unit distance (e.g., inverse megameters, or Mm^{-1}); visual range (i.e., how far one can see); and deciviews (dv), a useful metric for measuring increments of visibility change that are just perceptible to the human eye. Each can be estimated from the ambient concentrations of individual particle and gaseous constituents, taking into account their unique light-scattering (or absorbing) properties and making appropriate adjustments for relative humidity. Assuming natural conditions, visibility in the Northeast and Mid-Atlantic is estimated to have a light extinction of about 23 Mm^{-1}, which corresponds to a visual range of about 106 miles or eight dv (the lower the dv, the better the visibility). Under current polluted conditions in the region, average light extinctions ranges from 103 Mm^{-1} in the south to 55 Mm^{-1} in the north - these values correspond to a visual range of 24 to 44 miles or 23 to 17 dv, respectively. Updates to the Regional Haze Rule specify that dominant uncontrollable influences, such as volcanic activity and certain types of fires, can be removed from determination of worst visibility days for satisfaction of progress requirements. As a result, the rule now focuses on a metric referred to as the 20% most impaired visibility days.

The small particles that commonly cause hazy conditions in the East are primarily particles composed of sulfate, nitrate, organic carbon, elemental carbon (soot), and crustal material (e.g., soil dust, sea salt, etc.). Of these constituents, only elemental carbon impairs visibility by absorbing visible light; the others scatter light. Sulfate, nitrate, and organic carbon particles are secondary pollutants that form in the atmosphere from precursor pollutants, primarily sulfur dioxide (SO_2), nitrogen oxides (NO_X), and volatile organic compounds (VOCs), respectively. By contrast, soot and crustal material and some organic carbon particles are released directly to the atmosphere. Particle constituents also differ in their relative effectiveness at reducing visibility. Sulfate and nitrate based particles, for example, contribute disproportionately to haze because of their chemical affinity for water. This property allows them to grow rapidly in the presence of moisture, to the optimal particle size for scattering light (i.e., 0.1 to 1 micrometer).

Monitoring data collected over the last decade show that fine particle[3] concentrations, and hence visibility impairment, are generally highest near industrial and highly populated areas of the Northeast and Mid-Atlantic. Particle concentrations are lower, and visibility conditions are better, at the more northerly Class I sites (such as the Great Gulf and Presidential Range - Dry River Wilderness in New Hampshire), where current visibility on the 20% clearest days[4] (4.7 dv)[5] is close to natural (3.73 dv), unpolluted conditions. Because there are naturally occurring visibility impairing emissions, the 20% most impaired days' metric is applicable to natural conditions. Natural visibility on the 20% most impaired days at Great Gulf/Presidential-Dry River Wilderness is estimated to be 9.78 dv (compared to 3.73 dv on the best days). Current visibility on 20% most impaired visibility days is 12.33 dv. About half of the worst visibility days in the New Hampshire Class I areas occur in the summer when meteorological conditions are more conducive to the formation of sulfate from SO_2 and to the oxidation of organic aerosols. The remaining worst visibility days are divided nearly equally among spring, winter, and fall. In contrast to sulfate and organic carbon, the nitrate contribution is typically higher in the winter months. The crustal and elemental carbon fractions do not show a clear pattern of seasonal variation. In addition, winter and summer transport patterns are different, possibly leading to different contributions from upwind pollutant source regions.

1.2 Regulatory Framework

In amendments to the CAA in 1977, Congress added Section 169A (42 U.S.C. 7491), setting forth the following national visibility goal:

> "Congress hereby declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Federal Class I areas which impairment results from manmade air pollution."

The "Class I" designation was initially given to 158 areas, in existence as of August 1977 that met these criteria:

- All national parks greater than 6,000 acres.
- All national wilderness areas and national memorial parks greater than 5,000 acres.
- One international park.

In 1999, the EPA announced a major effort to improve air quality in these areas. The Regional Haze Rule calls for state and federal agencies to work together to improve visibility in 156[6] designated national parks and wilderness areas (Figure 1-1). The rule requires the states, in coordination with the EPA and the Federal Land Managers (FLM) represented by the National Park Service, the U.S. Forest Service and the U.S. Fish and Wildlife Service, and other interested parties, to develop and implement air quality protection plans to reduce the pollution that causes visibility impairment.

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3 "Fine particles" refers throughout this report to particles less than or equal to 2.5 micrometers in diameter, consistent with EPA's fine particle NAAQS.

4 "20% clearest visibility conditions" are defined throughout this report as the simple average of the lower 20th percentile of a cumulative frequency distribution of available data (expressed in dv).

5 Five-year average, 2015-2019.

6 In 1980, Bradwell Bay, Florida, and Rainbow Lake, Wisconsin, were excluded for purposes of visibility protection as Federal Class I areas.

1.2.1 The Regional Haze Rule

The federal requirements that states must meet to achieve national visibility goals are contained in Title 40: Protection of Environment, Part 51 – Requirements for Preparation, Adoption, and Submittal of Implementation Plans, Subpart P – Protection of Visibility (40 CFR §§51.300-309). Known more simply as the Regional Haze Rule, these regulations were adopted on July 1, 1999, and went into effect on August 30, 1999. The rule seeks to address the combined visibility effects of various pollution sources over a large geographic region. This wide-reaching pollution net means that many states – even those without Federal Class I areas – are required to participate in haze reduction efforts.

Regional haze regulations recognize that visibility impairment is fundamentally a regional phenomenon. Emissions from numerous sources over a broad geographic area commonly create hazy conditions across large portions of the eastern U.S. because of the long-range transport of airborne particles and precursor pollutants in the atmosphere. The key sulfate precursor, SO_2, for example, has an atmospheric lifetime of several days and is known to be subject to transport distances of hundreds of miles. NO_X and some organic carbon species are also subject to long-range transport, as are small particles of soot and crustal material.

1.2.2 Revision to the Regional Haze Rule

States are required to submit periodic plans demonstrating how they have and will continue to make progress toward achieving their visibility improvement goals. The first state plans were due in December 2007 and covered the 2008-2018 planning period. The 2017 revision to the Regional Haze Rule addresses requirements for the second planning period, 2018-2028. The updated rule makes the following changes:

- Adjusts the SIP submittal deadline for the second planning period from July 31, 2018 to July 31, 2021.
- Adjusts interim progress report submission deadlines so that second and subsequent progress reports will be due by January 31, 2025, July 31, 2033, and every 10 years thereafter. This means that one progress report will be required mid-way through each planning period.
- Removes the requirement for interim progress reports to take the form of SIP revisions. States will be required to consult with FLMs and obtain public comment on their progress reports before submission to the EPA. These progress reports will be reviewed by the EPA, but the EPA will not formally approve or disapprove them.
- Clarifies EPA's long-standing interpretations of the 1999 Regional Haze Rule, including:
    - Requirements that RPGs be set based on the long-term strategy.
    - Obligations of states with mandatory Federal Class I areas and other states contributing to impairment at those areas.
    - Obligations on states setting RPGs that provide for a slower rate of progress than that needed to attain natural conditions by 2064.

Another key change in the 2017 revision is addition of the word "anthropogenic" to the definition of most impaired, that is: "Most impaired days means the twenty percent of monitored days in a calendar year with the highest amounts of **anthropogenic** visibility impairment." (emphasis added) (40 CFR §51.301). EPA's 2018 Technical Guidance[7] states that the 20% most impaired days each year at each Class I area based on daily anthropogenic impairment. Previously, states and the EPA tracked visibility progress on the 20% worst visibility days, regardless of origin. Throughout this document, New Hampshire uses both approaches, referencing the haziest or "worst" days with respect to the first implementation period, and "most impaired," or anthropogenic impairment only, for discussing the baseline and projections for this implementation period plan. Comparisons of the two are also made.

1.2.3 State Implementation Plan (SIP)

The core requirement for states where a mandatory Federal Class I area is located is the submission of an implementation plan containing the elements found in 40 CFR §51.308(d)(1) through (4). New Hampshire submitted its SIP revision to meet these requirements in January 2010. It was approved by the EPA on August 22, 2012 [77 FR 50602]. In addition to the core requirements referenced above, the plan also covered the BART components of 40 CFR §51.308(e), and addressed requirements pertaining to regional planning, and state/tribe and FLMs' coordination and consultation.

40 CFR §51.308(g) requires the New Hampshire Department of Environmental Services (NHDES) to submit a report to EPA every 5 years that evaluates progress toward the RPG for each mandatory Federal Class I area located within the State and each mandatory Federal Class I area located outside the State that may be affected by emissions from within the State. NHDES submitted its first progress report for the first implementation period (2008 – 2018) on December 16, 2014 [81 FR 70360].

1.2.4 Cross-Reference for Regional Haze Rule Requirements

Table 1-1 identifies each section of the SIP that addresses the Regional Haze Rule requirements specified in 40 CFR §51.308(f) and (g) for this second planning period as well as the steps outlined in EPA's Guidance on Regional Haze SIPs for the Second Implementation Period issued in August 2019 (EPA's 2019 Guidance)[8] .

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7 EPA, (December 2018). *Technical Guidance on Tracking Visibility Progress for the Second Implementation Period of the Regional Haze Program*. *EPA-454/R-18-010*. Available at: https://www.epa.gov/sites/production/files/2018-12/documents/technical_guidance_tracking_visibility_progress.pdf. Appendix J.

8 EPA, (August 2019). *Guidance on Regional Haze State Implementation Plans for the Second Implementation Period*. EPA-457/B-19-003. Available at: https://www.epa.gov/sites/default/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf

Table 1-1: Cross Reference for Regional Haze Rule Requirements and 2019 EPA Guidance to New Hampshire SIP Sections

40 CFR §51.308	EPA Guidance on Regional Haze SIPs (2019)	New Hampshire SIP Section	Description
(f)		4	Requirements of periodic revisions of SIPs for regional haze
(f)(1)	Step 1 – Ambient Data Analysis	4.1	Calculations of baseline, current and natural visibility conditions; progress to date and the URP
(i)		4.1.1	Baseline visibility conditions for the most impaired and clearest days
(ii)		4.1.1	Natural visibility conditions for the most impaired and cleanest days
(iii)		4.1.1	Current visibility conditions for the most impaired and cleanest days
(iv)		4.1.2	Progress to date for the most impaired and clearest days
(v)		4.1.3	Differences between current visibility condition and natural visibility condition
(vi)		4.1.4	URP
(f)(2)		4.2, 4.2.8, 4.2.9, 4.2.10	LTS: Enforceable emissions limitations, compliance schedules, and other measures necessary to make reasonable progress
	Step 2 – Determination of Affected Class I Areas in other states	2, 4.2	Determination of Class I Areas in other states that may be affected by the State's own emissions
(i)	Step 5 – Decisions on what control measures are necessary to make reasonable progress	4.2, 4.2.1, 4.2.2, 4.2.9, 4.2.10	Evaluation and determination of emission reduction measures necessary to make reasonable progress by considering four factors
	Step 3 – Selection of sources for analysis	4.2, 4.2.1	Evaluation of major and minor stationary sources or groups of sources, mobile sources and area sources; Description of the criteria used to determine sources for evaluation
	Step 4 – Characterization of factors for emission control measures	4.2, 4.2.1, 4.2.2	Description of how four factors were taken into consideration in selecting measures in the LTS
(ii)		3, 4.2.3	Consultation with other states that have emissions reasonably anticipated to contribute to visibility impairment and coordinate emission management strategies

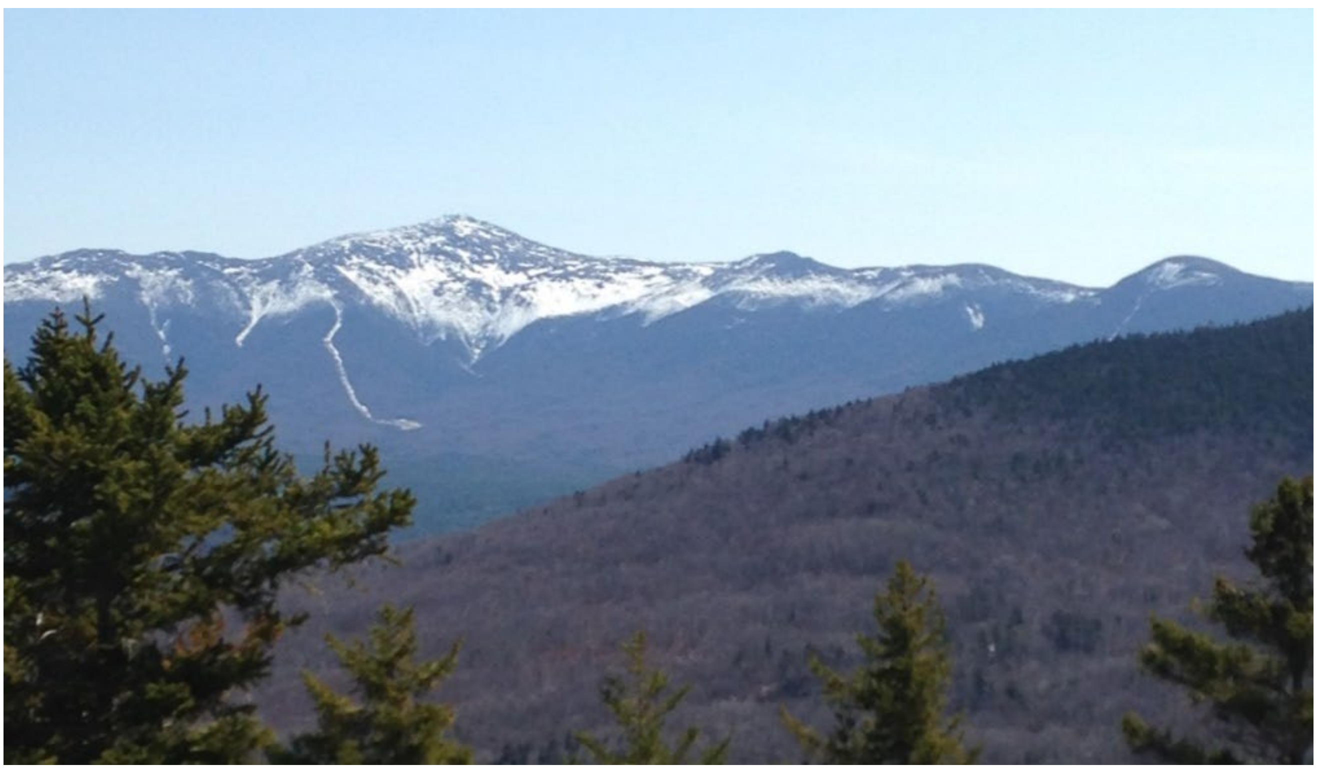
40 CFR §51.308	EPA Guidance on Regional Haze SIPs (2019)	New Hampshire SIP Section	Description
(iii)		4.2.7	Documentation of technical basis, including modeling, monitoring, cost, engineering, and emissions information, on which the State is relying to determine emission reduction measures necessary for reasonable progress
(iv)		4.2.8	Additional factors must be considered in developing the LTS
(iv)(A)		4.2.8	Emission reductions due to ongoing pollution control programs
(iv)(B)		4.2.8	Mitigate the impacts of construction activities
(iv)(C)		4.2.8	Source retirement and replacement schedules
(iv)(D)		4.2.8	Smoke management practices for prescribed fire
(iv)(E)		5.4	Anticipated net effect on visibility due to projected changes in point, area, and mobile source emission over the LTS period
(f)(3)		4.3	Reasonable Progress Goals
(i)	Step 6 – Regional Scale Modeling of the LTS to Set the RPGs for 2028	4.3	Establish RPGs that reflect visibility conditions projected to be achieved by the end of the implementation period as a result of the LTS
(ii)(A)	Step 7A – Progress, degradation, and URP glidepath checks	Not applicable	RPGs for most impaired days that provide for a slower rate of improvement in visibility than the URP
(ii)(B)	Step 7B – URP glidepath checks	Not applicable	Evaluation of additional emission reductions within a state where sources affect Class I areas in another state
f(4)		4.4	Additional monitoring strategy must be included if advised by Administrator, Regional Administrator or FLM
f(5)		5	Include progress report with SIP
f(6)	Step 8 – Additional requirements for SIPs	6	Monitoring strategy and other implementation plan requirements
(i)		3.2.1, 6.1	Establish additional monitoring sites or equipment as needed
(ii)		6.1	Procedures by which monitoring data and other information are used
(iii)		Not applicable	Procedures for monitoring visibility in states with no Class I Federal areas
(iv)		6.1	Reporting of all visibility monitoring data annually

40 CFR §51.308	EPA Guidance on Regional Haze SIPs (2019)	New Hampshire SIP Section	Description
(v)		5.4, 6.1	Inventory of pollutant emissions that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I Federal area
(vi)		6.1	Reporting, recordkeeping, and other measures, necessary to assess and report on visibility
(g)		5	Requirements for periodic reports describing progress towards RPGs
(1)		5.1	Description of the implementation status of all measures for achieving RPGs for mandatory Class I Federal areas within and outside the State
(2)		5.2	Summary of emissions reductions achieved throughout the State through implementation of measures in the plan
(3)		5.3	Assessment of visibility conditions and changes for each mandatory Class I Federal area within the State
(4)		5.4	Analysis of change in emissions of pollutants contributing to visibility impairment from all sources and activities within the State over the period since the period addressed in the most recent plan
(5)		5.5	Assessment of significant changes in anthropogenic emissions within or outside the State that have occurred since the period addressed in the most recent plan
(6)		8	Assessment of whether current implementation plan elements are sufficient to enable the State, or other states with mandatory Class I Federal areas affected by emissions from the State, to meet all RPGs
(7)		Not applicable	Review of visibility monitoring strategy for first implementation period
(8)		Not applicable	Summary of most recent periodic assessment of the smoke management program

1.3 New Hampshire's Class I Areas

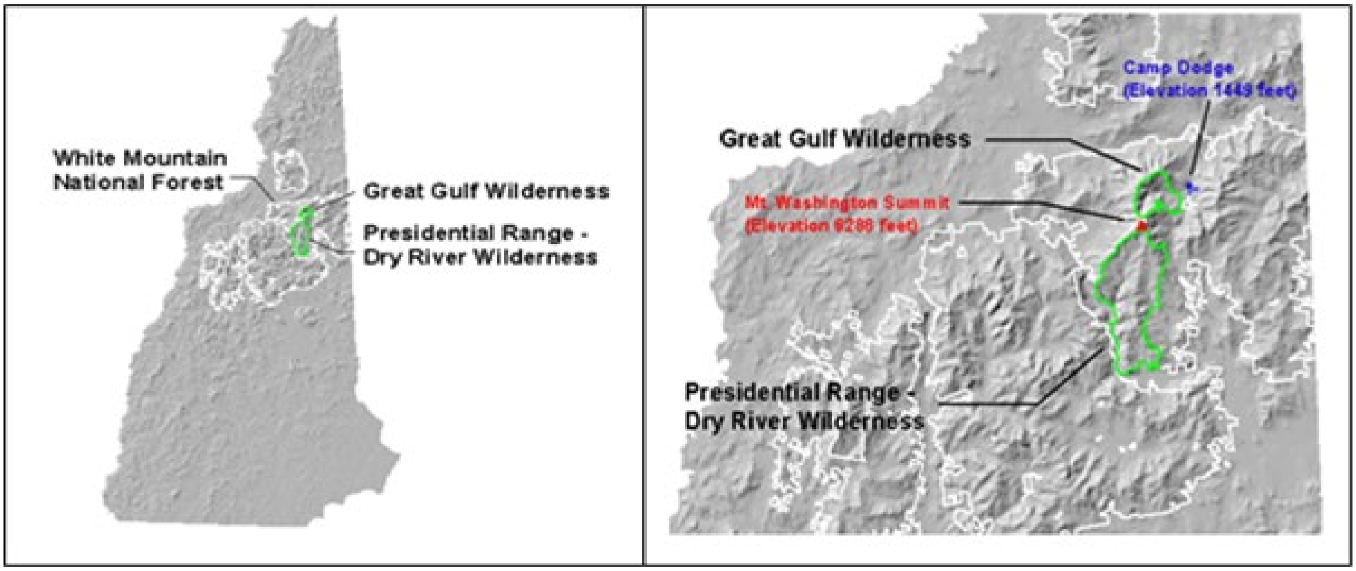
In New Hampshire, the U.S. Forest Service manages two Class I areas in the WMNF: Great Gulf Wilderness and the Presidential Range - Dry River Wilderness. These Class I areas flank the northern and southern slopes of the nationally renowned Mt. Washington in the Presidential Range of the White Mountains (Figure 1-2). Each of these areas covers thousands of acres containing high mountain terrain, scenic vistas, and interesting or unique geologic formations and vegetation communities (Figure 1-3). Many species of wildlife are present, including a number of alpine-zone residents. Cool, crystal-clear streams, cascades, and high-elevation ponds are common throughout the two areas, and the region is full of natural woodland. Hardwoods are most abundant on the lower slopes; mixed birches, maples and spruce-fir dominate the mid-slopes; and spruce-fir is most common on the upper mountainsides. The unusual low-elevation tree line in the White Mountains of New Hampshire is caused by the high winds and harsh conditions this area experiences through the year. The result is a fragile, near-Arctic-tundra vegetation at the higher elevations.

Figure 1-2: Mt. Washington from the West[9]



[9] Photos at Figures 1-2, 1-4 and 1-5 taken by Felice Janelle.

Figure 1-3: Location of New Hampshire's Class I Areas



The two New Hampshire Class I areas are heavily visited by tourists and hikers. Mt. Washington summit, while close but not in the Federal Class I areas, represents a favorite hiking, road and cog railway accessible tourist location to take in the views that reach into four states, plus Canada. Views of Mt. Washington from around the State are an important part of tourism and the way of life in the State.

Figure 1-4: View of Great Gulf Wilderness from the East

1.3.1 Great Gulf Wilderness

The Great Gulf Wilderness is located in Greens Grant (Coos County) in the WMNF of northern New Hampshire (Figure 1-3). Occupying the northeastern slopes of the Presidential Range, Great Gulf covers an area of 5,552 acres and ranges in elevation from 1,680 to 5,807 feet. The area includes many rivulets that drain eastward to the West Fork of the Peabody River. For visitors, the Great Gulf has 21.3 miles of marked trails, which offer some of the best views of the ridges and summits of the Presidential Range. (Figure 1-4)

1.3.2 Presidential Range – Dry River Wilderness

The Presidential Range - Dry River Wilderness is also located in Greens Grant in the WMNF of northern New Hampshire (Figure 1-3); however, at 29,000 acres, it is about five times larger than the Great Gulf Wilderness. Ranging in elevation from 880 to 5,413 feet, the Presidential Range - Dry River Wilderness constitutes a rugged expanse of mountains and valleys lying to the south of Mt. Washington's summit. On its western side, the area flanks other peaks in the Presidential Range, including Mt. Eisenhower and Mt. Monroe. The wilderness area extends across and beyond the central valley of the Dry River to the Saco River, encompassing numerous brooks and smaller, heavily forested mountains (Figure 1-5).

Figure 1-5: View of Presidential Range Dry River Wilderness from the North

As the name suggests, the Dry River is almost without water by late summer but swells quickly during heavy rains. There are 43 miles of maintained trails in the area. Because of its remote location, this area receives fewer visitors than Great Gulf (about 7,000 annually). Its southern portion has almost no trails, is very steep and rugged, and offers a rare degree of solitude.

1.4 Monitoring and Recent Visibility Trends

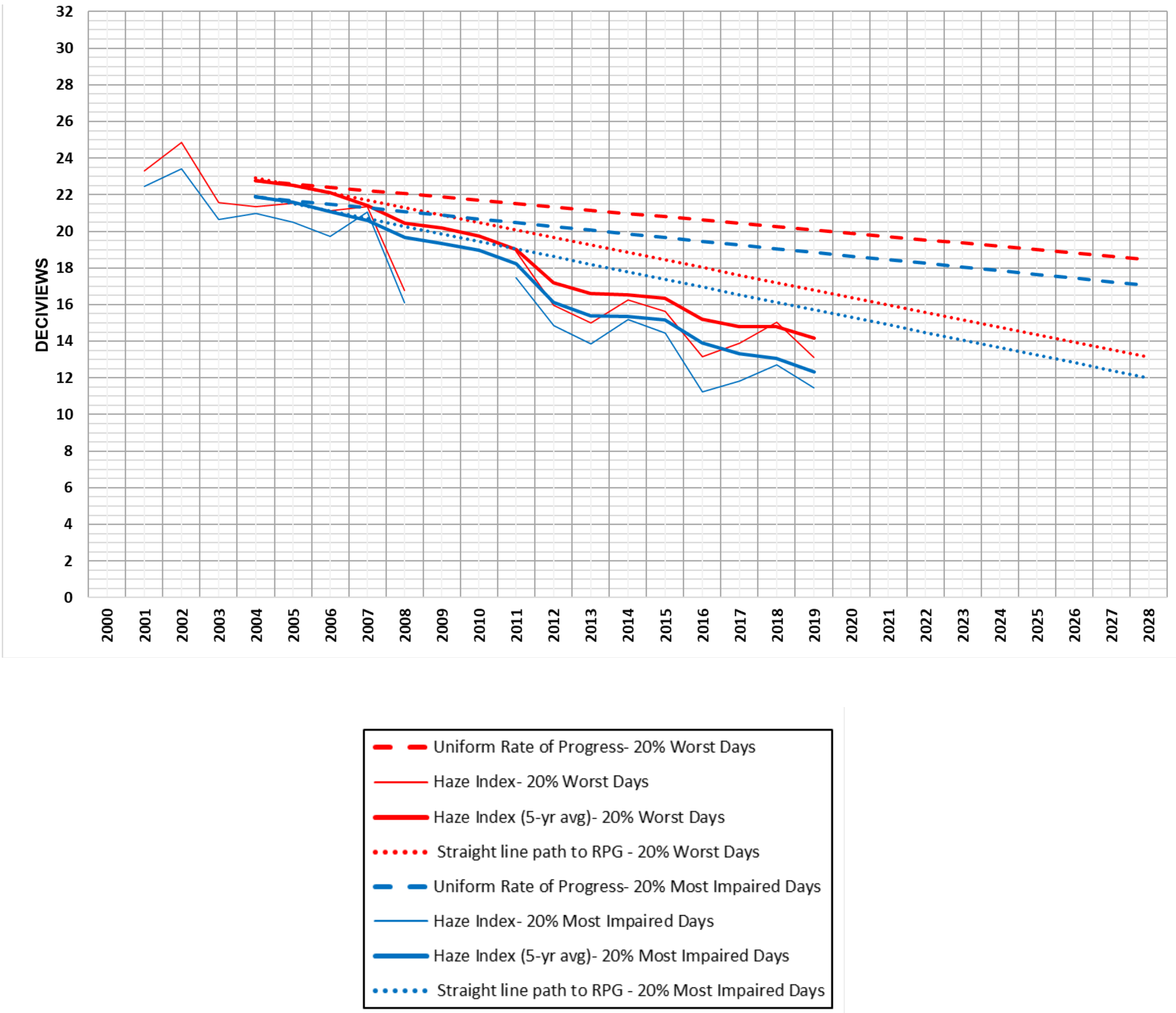
Visibility monitoring at Great Gulf Wilderness and Presidential Range - Dry River Wilderness is accomplished with instruments located at a single site at Camp Dodge. This monitoring station represents both wilderness areas, and for this reason, New Hampshire's Federal Class I areas are often referred to as simply the Great Gulf Wilderness. Instruments at Camp Dodge measure and record light scattering aerosols and relative humidity. This information is tracked over time to look for trends.

Figure 1-6 depicts recent visibility trends (in annual average dv) at Great Gulf Wilderness and Presidential Range - Dry River Wilderness for the 20% most and least visibility-impaired days for each year from 2000 to 2019. While visibility data was collected during the period of 2009 through 2010, equipment reliability issues prevented collection of sufficient data to develop annual summary statistics, and is thus excluded from this chart. Trends were developed by staff from the Maine Department of Environmental Protection (ME DEP)[10] for both the previously approved calculation method[11] looking at "20% worst" visibility days and EPA proposed calculation method looking at the "20% most impaired" visibility days. The blue markings represent information based on revised calculation methodology and the red markings indicate data based on the previous methodology. Solid lines represent 1-year (thin line) and 5-year averages (bold line) of actual monitoring data. Dashed lines indicate the glideslope between the base period and 2064 goals with points along these lines representing the URP for each

[10] MANE-VU, (May 2017). *Regional Haze Metric Trends and HYSPLIT Trajectory Analyses.* Appendix A.
[11] EPA, (September 2003). *Guidance for Tracking Progress Under the Regional Haze Rule. EPA-454/B-03-004*. Available on the EPA site.

year. Dotted lines represent uniform rates towards RPGs that include the State's LTS. Actual 5-year monitoring averages (bold blue solid line) need to equal or be below the RPG (red dotted line) in 2028.

Figure 1-6: Regional Haze Metric Trends – Great Gulf Wilderness Area[12]



Visibility trends for the Class I sites in New Hampshire, and out of state Class I sites potentially impacted by New Hampshire, are noted in Table 1-2. This table was presented in New Hampshire's first progress report in 2014. It was updated to the revised metric (depicting impairment by anthropogenic sources only). It is noteworthy that visibility improvement as of the most recent 5-year average (2015-2019) at Great Gulf Wilderness Area is already ahead of the 2028 RPG thanks largely to energy market forces.

12 MANE-VU, (Dec 2020). *MANE-VU 2000-19 RH METRICS COMPARISON PLOTS 12-19-20*. Available at: https://otcair.org/manevu/document.asp?fview=Reports.

Table 1-2: Visibility trends for Class I sites in New Hampshire, or potentially impacted by New Hampshire (Observed Visibility vs. Reasonable Progress Goals, all values in dv)[13]

Federal Class I Area IMPROVE Site	2000-2004 5-Year Average	2015-2019 Annual Average	2028 Uniform Rate of Progress	2028 Baseline / Reasonable Progress Goal[14]
20% Most Impaired Days				
Acadia National Park	22.01	14.24	17.36	13.44 / 13.35
Moosehorn Wilderness Area*	20.66	12.99	16.38	13.20 / 13.12
Great Gulf Wilderness Area**	21.88	12.33	17.04	12.13 / 12.00
Lye Brook Wilderness Area	23.57	14.06	18.23	13.89 / 13.68
Brigantine Wilderness Area	27.43	18.53	20.74	18.16 / 17.97
20% Clearest Days				
Acadia National Park	8.78	6.36	--	6.33 / 6.33
Moosehorn Wilderness Area	9.16	6.48	--	6.46 / 6.45
Great Gulf Wilderness Area	7.65	4.69	--	5.11 / 5.06
Lye Brook Wilderness Area	6.37	4.88	--	3.90 / 3.86
Brigantine Wilderness Area	14.33	10.81	--	10.55 / 10.47

* IMPROVE site also represents Roosevelt Campobello International Park in New Brunswick, Canada.

** IMPROVE site also represents the Presidential Range-Dry River Wilderness Area.

[13] MANE-VU, (January 2020 revision). *Mid-Atlantic/Northeast U.S. Visibility Data 2004-2019 (2nd RH SIP Metrics)*, Appendix B.

[14] OTC, (October 2018). *Ozone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2011 Based Modeling Platform Support Document – October 2018 Update*. Appendix U.

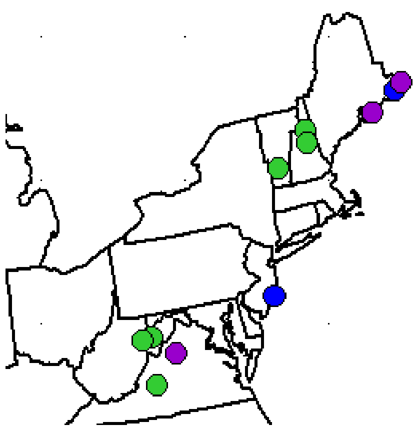
2 AREAS CONTRIBUTING TO REGIONAL HAZE

40 CFR §51.308(f)(2) of the Regional Haze Rule as outlined in Step 2 of EPA's 2019 Guidance document requires states to determine their contributions to visibility impairment at Federal Class I areas, and to determine the impact of emissions from outside the State on its Federal Class I areas. Additionally, the guidance states that:

> "a state has the flexibility to use any reasonable method for quantifying the impacts of its own emissions on out-of-state Class I areas, and it may use any reasonable assessment for this determination… A variety of technical, quantitative approaches exist to assess which out-of-state Class I areas may be affected by aggregate emissions from a given state. The most common approach in the first implementation period was to use a photochemical transport model to track the contribution due to emissions from whole states to specific Class I areas. This approach may also be used in the second implementation period, or a state may use another reasonable approach (e.g., back trajectory-based approaches)." (pg. 8)

In coordination with its regional partners, New Hampshire has identified states and sources potentially contributing to visibility impairment in New Hampshire's Class I areas and New Hampshire sources potentially contributing to visibility impairment to Class I areas in other states. The Class I areas assessed in this evaluation are MANE-VU's seven Class I areas and nearby Federal Class I Areas shown on Figure 2-1.

Figure 2-1: MANE-VU and Nearby Federal Class I Areas



MANE-VU CLASS I AREAS
Maine: Acadia National Park, Moosehorn Wilderness Area, Roosevelt Campobello International Park (spans the border of Maine and New Brunswick, Canada)
New Hampshire: Great Gulf and Presidential-Dry River Wilderness Areas
Vermont: Lye Brook Wilderness
New Jersey: Brigantine Wilderness Area
NEARBY FEDERAL CLASS I AREAS
West Virginia: Dolly Sods and Otter Creek Wilderness
Virginia: James River Face Wilderness Area and Shenandoah National Park

● National Park Service ● US Forest Service ● US Fish & Wildlife Service

As an initial step in this process, MANE-VU examined annual emissions inventories to find sectors that should be considered for further analysis[15]. EGUs emitting SO_2 and NOx and industrial sources emitting SO_2 were found to be point source sectors with emissions levels that warranted further scrutiny. Mobile sources were also found to be an important sector in terms of NOx emissions. After this initial work, MANE-VU initiated a screening process using two tools, California Puff model (CALPUFF) and Q/d, to

[15] Memo from MANE-VU TSC to MANE-VU Air Directors, (October 2016). *RE: Contribution Assessment Preliminary Inventory Analysis*. Appendix H.

determine baseline visibility impacts to identify potential sources or source categories that could be subject to four-factor analysis.

Source apportionment screening modeling using emissions to distance ratios and CALPUFF was used to identify major contributors to regional haze at the MANE-VU and nearby Federal Class I areas. These tools were used to help identify the emission sources in the eastern and central United States and to help determine which states with whom New Hampshire shall consult.

NHDES, in conjunction with the Vermont Department of Environmental Conservation (VT DEC), used the CALMET, CALPUFF and CALPOST programs to estimate pollutant concentrations and visibility impacts at eleven Class I areas in the northeastern U.S. This work enabled MANE-VU states to estimate and rank the relative impact of the sulfate and nitrate components of regional haze attributable to SO_2 and nitrogen oxide emissions from individual large stationary point sources. Emission units were selected for CALPUFF modeling based on their emission magnitudes and proximity to MANE-VU Class I areas. At a minimum, the five largest EGUs in each eastern state were modeled. Other large emitting units were added, thus some states had many units modeled. Industrial, commercial and institutional (ICI) units were initially selected based on similar emission magnitude to EGUs being modeled for a state. Smaller ICI units were added in MANE-VU states near Federal Class I areas. Additional detail can be found in Appendix C.[16]

The modeling resulted in the following observations:

1. Emissions of SO_2 and NO_x from EGUs are lower in 2015 compared to 2011 at many EGUs, however some show increased emissions.
2. Modeled sulfate, nitrate and visibility impacts for 95th percentile daily emissions produce substantially different results than modeling with annual emissions, especially for units with low operating hours.
3. The application of three different years of meteorology with identical emission rates can provide differing maximum sulfate, nitrate and visibility impacts. In some cases, the difference is substantial.
4. Emission sources located close to Federal Class I areas typically show higher visibility impacts than similarly sized facilities further away. However, visibility degradation appears to be dominated overall by more distant emission sources.
5. Some industrial emission sources other than EGUs may have significant impacts on visibility at MANE-VU Class I areas. Several of these sources are located in MANE-VU, while a few are located in nearby states.

This screening modeling was not intended to determine the need for mandatory regulation on specific emission sources, but rather to identify emission units for further evaluation. The results of the modeling are discussed further in Sections 2.1 and 2.2.

16 MANE-VU, (April 2017). *2016 MANE-VU Source Contribution Modeling Report, CALPUFF Modeling of Large Electrical Generating Units and Industrial Sources*. Appendix C.

Additional modeling was conducted by members of the MANE-VU Technical Support Committee (TSC) (specifically the Connecticut Department of Energy and Environmental Protection or CT DEEP) to estimate sulfate contributions to a receptor using the emissions (Q) over distance (d) (Q/d) method.[17] The analysis was done using ARC MAP® software that utilized the empirical formula:

$$I = C_i \left(Q/_d \right)$$

where the strength of an emission source, Q, is linearly related to the impact, I, that it will have on a receptor located a distance, d, away (the term C_i is a specific adjustment factor for wind direction that was used in this analysis). The MANE-VU Class I areas with IMPROVE monitors – Acadia, Brigantine, Great Gulf, Lye Brook and Moosehorn and several near-by Federal Class I areas with IMPROVE monitors located at Dolly Sods, James River Face and Shenandoah were used as receptors. The results were compared with a similar study published in 2012.[18] The James River Face Wilderness was added in the 2015 analysis because it was considered close enough in proximity to MANE-VU states to be an important receptor. The locations of receptors analyzed in the 2015 analysis are shown in Figure 2-2.

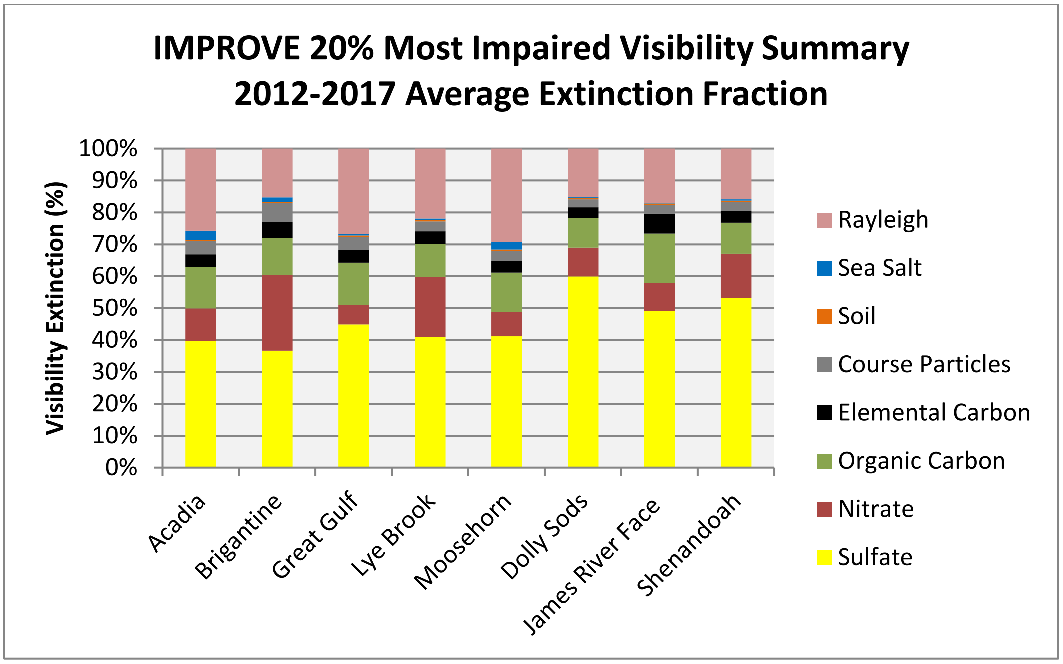
Figure 2-2: Receptors for the 2015 C_i(Q/d) Analysis

A review of recent IMPROVE speciated visibility data shows the relative importance of sulfates compared to other pollutants in regard to light extinction at the IMPROVE sites analyzed (Figure 2-3). This led to the conclusion that SO_2 was the most accurate and most relevant estimation for determining the impact of states' emissions to the visibility impairment of the MANE-VU Class I areas. Emissions of NO_X were considered in the final analysis and factored into Q/d calculations with chemistry information provided by CALPUFF modeling. Although nitrate generally accounts for a substantially smaller fraction of fine particle mass and related light extinction than sulfate and organic carbon at northeastern Federal Class I areas, it may play a more important role in urban settings and in the wintertime. In addition, NO_X may have an indirect effect on summertime visibility by virtue of its role in the formation of ozone. Furthermore, it is worth examining nitrates emanating from the electric sector in the Midwest where power plants contribute significantly to NO_X emissions.

17 MANE-VU TSC, (April 2016). *MANE-VU Updated Q/d*C Contribution Assessment*. Appendix D.

18 NESCAUM, (March 2012). *Contributions to Regional Haze in the Northeast and Mid-Atlantic United States: Preliminary Update through 2007*. Available at: http://www.nescaum.org/topics/regional-haze/regional-haze-documents.

Figure 2-3: Speciation at MANE-VU and Neighboring Class I Areas



Ohio was determined to be one of the top two contributors for all of the eight Federal Class I areas reviewed. Pennsylvania also continues to be one of the top three contributors for seven of the eight receptors. The majority of the top five contributors were very similar to the previous analysis, however significant reshuffling of the top five is apparent thus indicating the emissions reductions achieved were not equally applied among the neighboring states. Table 2-1 displays the Q/d quantitative contributions to the MANE-VU and neighboring Federal Class I areas between the 2012 analysis (2007 emissions) and the 2015 analysis (2011 emissions).

Table 2-1: Top Five Contributing U.S. States for Total State SO_2 Emissions Based on Q/d Analysis[19]

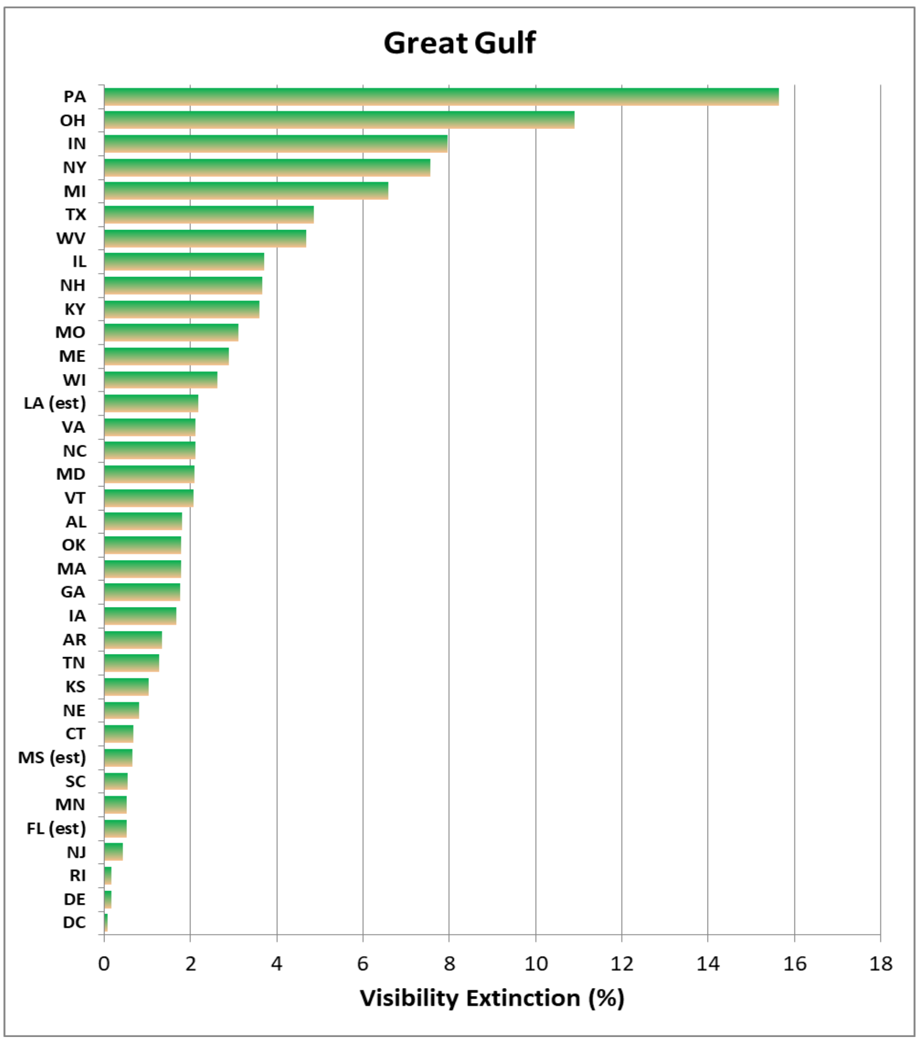
Federal Class I Area (Receptor)	Rank	2012 Analysis (2007 emissions)	2015 Analysis (2011 emissions)
Acadia	1	Pennsylvania	Ohio
	2	Ohio	Pennsylvania
	3	Indiana	Indiana
	4	Michigan	Michigan
	5	Georgia	Illinois
Brigantine	1	Pennsylvania	Pennsylvania
	2	Maryland	Ohio
	3	Ohio	Maryland
	4	Indiana	Indiana
	5	West Virginia	Kentucky
Dolly Sods	1	Pennsylvania	Ohio
	2	Ohio	West Virginia
	3	West Virginia	Pennsylvania
	4	Indiana	Indiana
	5	North Carolina	Kentucky
Great Gulf / Presidential-Dry River	1	Pennsylvania	Ohio
	2	Ohio	Pennsylvania
	3	Indiana	Indiana
	4	Michigan	Michigan
	5	New York	Illinois
James River Face	1	New to analysis	Ohio
	2		Pennsylvania
	3		Indiana
	4		Kentucky
	5		West Virginia
Lye Brook	1	Pennsylvania	Pennsylvania
	2	Ohio	Ohio
	3	New York	Indiana
	4	Indiana	New York
	5	Michigan/West Virginia	Michigan
Moosehorn/ Campobello	1	Pennsylvania	Ohio
	2	Ohio	Indiana
	3	Indiana	Illinois
	4	Michigan	Michigan
	5	Texas/Missouri/Illinois/West Virginia/New York	Texas
Shenandoah	1	Pennsylvania	Ohio
	2	Ohio	Pennsylvania
	3	West Virginia	Indiana
	4	Maryland	West Virginia
	5	Indiana	Virginia

[19] MANE-VU TSC, (April 2016). *MANE-VU Updated Q/d*C Contribution Assessment*. Appendix D.

2.1 States and Sources Contributing to Visibility Impairment in New Hampshire's Class I Areas

In 2016, NHDES and VT DEC[20] conducted modeling of point sources (EGUs and ICI units) to determine their contributions to eleven Federal Class I areas in the northeastern U.S. The modeling was used, in part, to estimate the visibility impairment attributable to SO_2 and NO_X emissions from other states impacting the 20% most impaired days at New Hampshire's Federal Class I areas. Emissions used for the MANE-VU contribution assessment modeling included EPA's Clean Air Markets Division (CAMD) 2015 daily EGU SO_2 and NO_X emissions and the Mid-Atlantic Regional Air Management Association (MARAMA) 2011 typical daily ICI SO_2 and NO_X emissions. As with other Federal Class I areas in MANE-VU and nearby, emissions from Pennsylvania and Ohio have a large impact in New Hampshire — over 25% (Figure 2-4). The impact of anthropogenic sulfate and nitrate is depicted in Figure 2-5. Individual sources are given in Table 2-2.

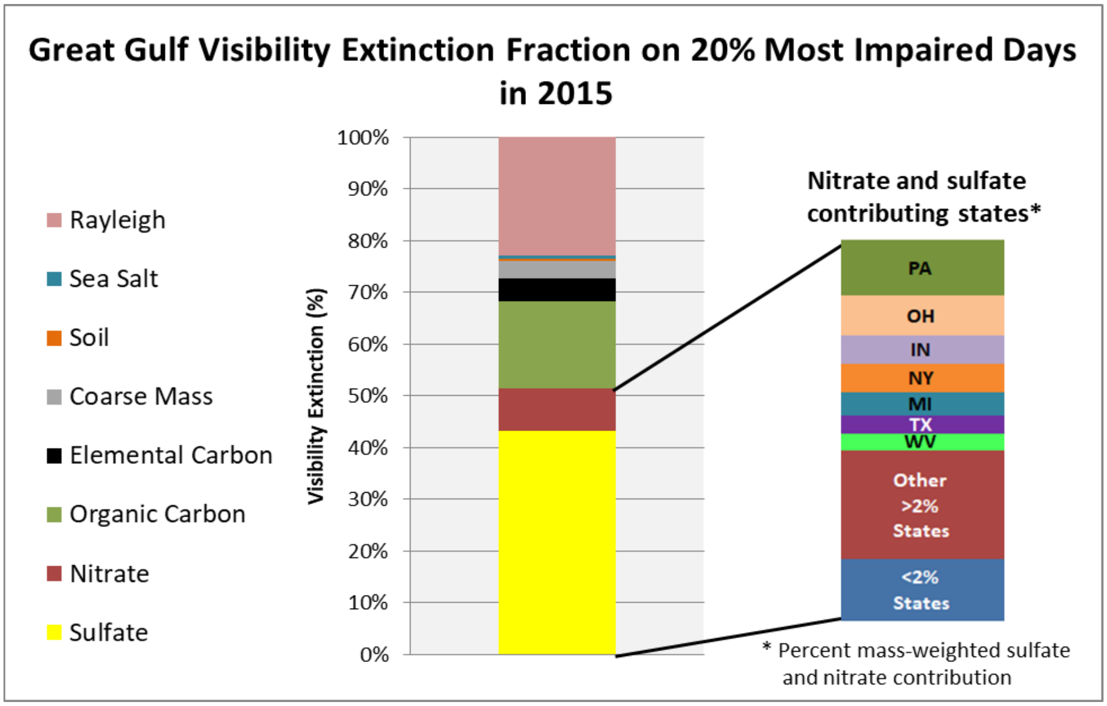
Figure 2-4: Estimated 2011-2015 Percent Mass Weighted Sulfate and Nitrate Contribution for Great Gulf, NH[21]



[20] MANE-VU, (April 2017). *2016 MANE-VU Source Contribution Modeling Report, CALPUFF Modeling of Large Electrical Generating Units and Industrial Sources*. Appendix C.

[21] MANE-VU TSC, (September 2017). *Selection of States for MANE-VU Regional Haze Consultation (2018)*. Appendix E.

Figure 2-5: Estimated State Contribution to Nitrate and Sulfate Visibility Impairment at New Hampshire's Class I Sites



Previously mentioned metrics analyses included speciation analyses for 2000-2015 and trajectory modeling analyses for the "most impaired" visibility days in 2002, 2011 and 2015 for Federal Class I areas in MANE-VU, and nearby Federal Class I areas in Virginia and West Virginia.[22] For MANE-VU states, 2002 is the modeling base year for the first round of regional haze SIPs, 2011 is the modeling base year for the current round of regional haze SIPs. Analysis years chosen were the same years used in the MANE-VU Source Contribution Modeling Report (i.e., CALPUFF and Q/d).[23]

CALPUFF modeling results used for comparison with the trajectory analyses include states having an impacting EGU or ICI source with at least a 1 Mm^{-1} light extinction impact to a Federal Class I area. Table 2-2 shows the results of this modeling for New Hampshire and other MANE-VU states' EGU emissions sources impacting Great Gulf above the 1 Mm^{-1} light extinction impact threshold. **Due to concerns raised during consultation about CALPUFF performance at distances greater than 50 km, MANE-VU agreed to use the model only as a screening tool to identify contributing states and sources that may benefit from more detailed examination.**

22 MANE-VU, (May 2017). *Regional Haze Metric Trends and HYSPLIT Trajectory Analyses.* Appendix A.

23 MANE-VU, (April 2017). *2016 MANE-VU Source Contribution Modeling Report, CALPUFF Modeling of Large Electrical Generating Units and Industrial Sources*. Appendix C, and MANE-VU TSC, (April 2016). *MANE-VU Updated Q/d*C Contribution Assessment*. Appendix D.

Table 2-2: Individual Electrical Generation Unit Sources Contributing to Visibility Impairment at New Hampshire's Class I Areas Based on CALPUFF modeling with 2015 CAMD Emissions[24]

State	Facility Name	Facility/ ORIS ID	Unit	Contributions to Great Gulf		
				24-hr Max SO_4 Ion ($\mu g/m^3$)	24-hr Max NO_3 Ion ($\mu g/m^3$)	Est Extinction (Mm^{-1})
OH	Avon Lake Power Plant	2836	12	0.64	0.13	**8.9**
PA	Homer City	3122	1	0.58	0.10	**7.3**
PA	Homer City	3122	2	0.52	0.09	**6.4**
ME	William F Wyman	1507	4	0.16	0.20	**4.1**
OH	Muskingum River	2872	5	0.30	0.01	**3.6**
VA	Yorktown Power Station	3809	3	0.24	0.07	**3.6**
KY	Big Sandy	1353	BSU1, BSU2	0.20	0.05	**2.9**
NH	Merrimack	2364	2	0.04	0.19	**2.9**
WV	Harrison Power Station		1 (25%), 2 (20%)	0.05	0.20	**2.8**
GA	Harllee Branch	709	3&4	0.24	0.02	**2.8**
IN	Rockport	6166	MB1, MB2	0.14	0.11	**2.7**
IN	Wabash River Gen Station	1010	2,3,4,5,6	0.21	0.01	**2.6**
OH	Killen Station	6031	2	0.09	0.13	**2.4**
OH	Gen J M Gavin	8102	1	0.13	0.08	**2.4**
PA	Keystone	3136	1	0.15	0.09	**2.3**
OH	Gen J M Gavin	8102	2	0.12	0.07	**2.2**
PA	Keystone	3136	2	0.15	0.09	**2.2**
NH	Newington	8002	1	0.07	0.13	**2.2**
MI	Trenton Channel	1745	9A	0.16	0.03	**2.1**
OH	W H Zimmer Generating Station	6019	1	0.08	0.11	**2.1**
MI	St. Clair	1743	6	0.17	0.01	**2.0**
PA	Shawville	3131	3,4	0.15	0.04	**1.9**
MI	St. Clair	1743	7	0.14	0.02	**1.8**
MA	Brayton Point	1619	4	0.09	0.06	**1.8**
OH	Muskingum River	2872	1,2,3,4	0.13	0.03	**1.8**
NY	Oswego Harbor Power	2594	6	0.09	0.06	**1.8**
NY	Somerset Operating Company (Kintigh)		1	0.10	0.05	**1.7**
PA	Homer City		3	0.06	0.12	**1.7**
IL	Powerton		51,52,61,62	0.11	0.04	**1.7**
WV	Kammer	3947	1,2,3	0.10	0.04	**1.6**
MI	Belle River		2	0.09	0.06	**1.6**
VA	Yorktown Power Station	3809	1,2	0.11	0.02	**1.5**
MI	Belle River		1	0.08	0.06	**1.5**
WV	Pleasants Power Station	6004	1	0.05	0.08	**1.4**
PA	Montour	3149	1	0.07	0.07	**1.4**
OH	Kyger Creek	2876	1,2,3,4,5	0.05	0.06	**1.4**
IN	Tanners Creek	988	U4	0.11	0.02	**1.4**
MI	St. Clair	1743	1,2,3,4,5,6	0.08	0.05	**1.4**
WV	Kanawha River	3936	1,2	0.07	0.04	**1.3**

24 MANE-VU, (April 2017). *2016 MANE-VU Source Contribution Modeling Report, CALPUFF Modeling of Large Electrical Generating Units and Industrial Sources*. Appendix C.

State	Facility Name	Facility/ ORIS ID	Unit	Contributions to Great Gulf 24-hr Max SO_4 Ion (µg/m^3)	24-hr Max NO_3 Ion (µg/m^3)	Est Extinction (Mm^{-1})
PA	Brunner Island	3140	1,2	0.05	0.06	**1.3**
IN	Michigan City Generating Station		12	0.11	0.01	**1.3**
PA	Montour	3149	2	0.05	0.07	**1.2**
MI	J H Campbell		A,B,1,2	0.09	0.02	**1.2**
NH	Merrimack	3264	1	0.01	0.08	**1.2**
PA	Brunner Island	3140	3	0.05	0.06	**1.1**
OH	Conesville	2840	5,6	0.04	0.05	**1.1**
MI	J H Campbell		3 (50%)	0.10	0.01	**1.1**
PA	Martins Creek	3148	3,4	0.001	0.09	**1.1**
KY	Ghent	1356	3,4 … (2,3)	0.05	0.04	**1.0**
IN	IPL – Harding Street Station (EW Stout)		50	0.09	0.002	**1.0**

2016 CALPUFF modeling was also performed in seven phases to include different combinations of emission types (EGU 95th percentile daily or annual, industrial typical daily), emission years (2011 or 2015) and meteorological data (2002, 2011, or 2015). The CALPUFF report provides a table of the top-ten 2011 and 2015 EGU emission sources and the top-five ICI sources impacting each of the eleven regional Class I areas. Table 2-3 shows the results of this modeling for New Hampshire and other MANE-VU states' ICI emissions sources specifically impacting Great Gulf above the 1 Mm^{-1} light extinction impact threshold.

Table 2-3: ICI Sources Contributing to Visibility Impairment at New Hampshire's Class I Areas Based on CALPUFF modeling with 2011 Emissions Information[25]

State	Facility Name	Facility/ ORIS ID	Unit	Contributions to Great Gulf 24-hr Max SO_4 Ion (µg/m^3)	24-hr Max NO_3 Ion (µg/m^3)	Est Extinction (Mm^{-1})
MD	Luke Paper Company	7763811	All	0.55	0.11	**6.9**
ME	SAPPI – Somerset	8200111	All	0.02	0.24	**3.1**
NY	Finch Paper LLC	8325211	All	0.01	0.14	**1.7**
NY	Lafarge Building Materials Inc.	8105211	All	0.08	0.07	**1.4**
ME	Verso Paper – Androscoggin Mill	7764711	All	0.02	0.14	**1.4**
IN	ArcelorMittal Burns Harbor Inc.	7376511	All	0.05	0.04	**1.2**
OH	P. H. Glatfelter Company	8131111	All	0.09	0.01	**1.1**

As a result of this analysis, New Hampshire concluded that three EGUs at two New Hampshire facilities (Merrimack and Newington) would be included in the list of sources for further analysis based on the modeling results which showed these sources had a greater than 1 Mm^{-1} light extinction contribution at Great Gulf using 2015 CAMD emissions.

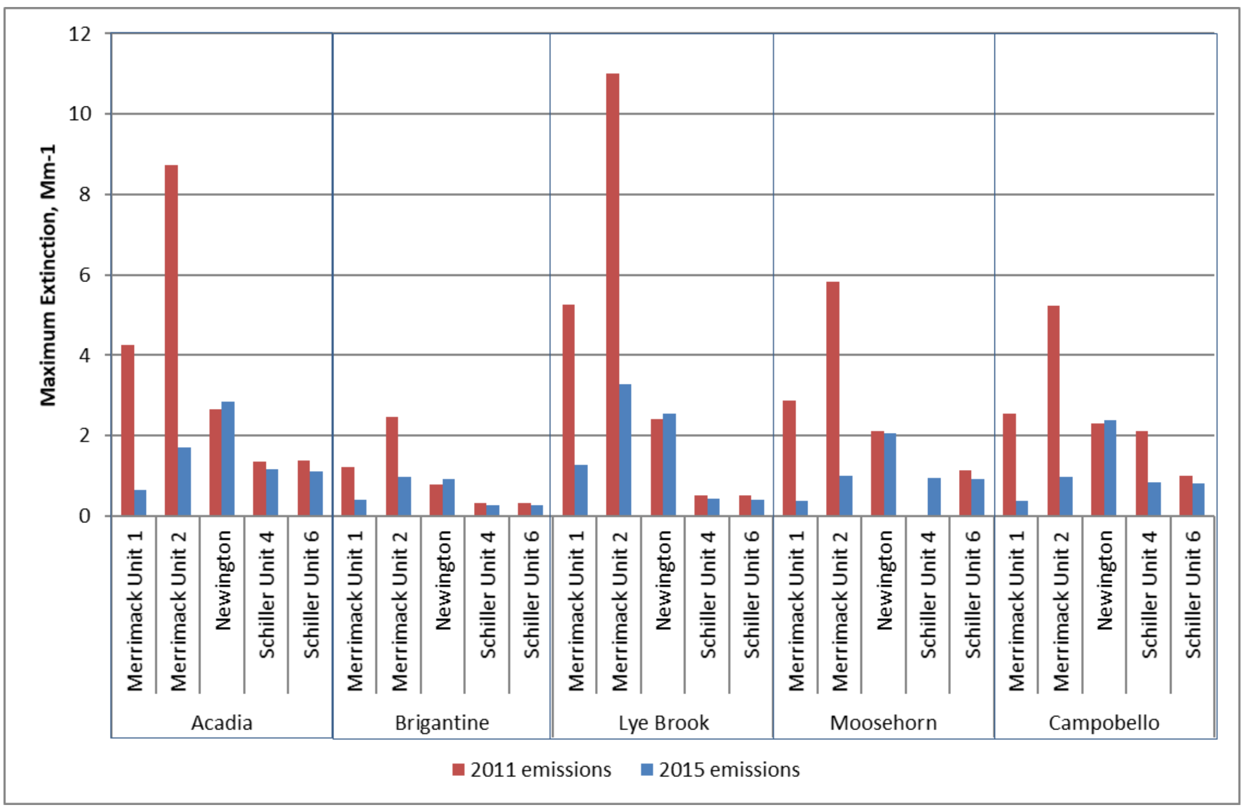
25 MANE-VU, (April 2017). *2016 MANE-VU Source Contribution Modeling Report, CALPUFF Modeling of Large Electrical Generating Units and Industrial Sources*. Appendix C.

2.2 New Hampshire Emission Sources Potentially Contributing to Visibility Impairment to Federal Class I Areas in Other States

The same modeling conducted in 2016 by NHDES and VT DEC was used, in part, to estimate the visibility impairment attributable to New Hampshire's point sources (EGUs and ICI units) to predict their impact on the 20% most impaired days at all MANE-VU Class I areas. Specifically, SO_2 and NO_X emissions from New Hampshire-based EGUs and ICI sources were assessed with CALPUFF using the same methodology as MANE-VU.

In summary, emissions and visibility extinctions caused by New Hampshire-based EGUs were lower in 2015 than in 2011 except for Newington Station, which was slightly higher (see Figure 2-6). Emissions at Merrimack Station were down significantly due to installation of a Flue Gas Desulfurization (FGD) system, also known as a scrubber. Since 2015, Merrimack and Newington stations have operated only periodically, and when Newington Station has operated, it has primarily used natural gas rather than oil.

Figure 2-6: Maximum Extinction for Emission Years 2011 and 2015 at Using Three Years of Meteorological Data (2002, 2011, 2015) [26]



Tables 2-4 and 2-5 provide estimated modeled visibility impacts among multiple phases of modeling. Each of these phases represent 2011 95th percentile emissions impacts, but differ in the year of meteorology (2002, 2011, or 2015). For comparison, Table 2-4 also provides modeling results (shown in **red** text) from another phase of modeling specific to 2015: 95th percentile daily emissions with 2015

[26] MANE-VU, (April 2017). *2016 MANE-VU Source Contribution Modeling Report, CALPUFF Modeling of Large Electrical Generating Units and Industrial Sources*. Appendix C.

meteorology. The maximum values upon which each are ranked are bolded in blue font. For example, Merrimack Station is ranked third out of ten EGUs affecting Lye Brook in Table 2-4 based on the 2011 data/2011 meteorology extinction value of 11.0.

Table 2-4: New Hampshire Visibility Impairing EGU Point Sources (2011 emissions data)

Federal Class I Area	Facility Info				2011 95th Percentile Extinction Value (Mm^{-1})			2015 95th Percentile Extinction Value (Mm^{-1})	Distance (mi)
	Rank	Facility	ORIS ID	Unit IDs	Meteorological Year				
					2002	2011	2015	2015	
Acadia	5	Merrimack	2364	2	**8.7**	8.3	8.2	**1.7**	180
Lye Brook	3	Merrimack	2364	2	5.5	**11.0**	2.3	**3.3**	79
Lye Brook	10	Merrimack	2364	1	2.7	**5.3**	1.1	**1.3**	79
Moosehorn	7	Merrimack	2364	2	5.5	5.3	**5.8**	**1.0**	244
Campobello	7	Merrimack	2364	2	**5.2**	5.1	4.6	**1.0**	254

Table 2-5 follows the same format as Table 2-4, but represents modeling of 2015 emissions for all three meteorology years. Note that only the 2015 meteorology year is based on modeled outputs; extinction values for the 2002 and 2011 meteorology years are estimated using emissions ratios. This table also compares these 2015 results to the maximum 2011 95th percentile emission impacts (shown in **red** text) among the three years of meteorology.

Table 2-5: New Hampshire Visibility Impairing EGU Point Sources (2015 emissions data)

Federal Class I Area	Facility Info				2015 95th Percentile Extinction Value (Mm^{-1})			2011 95th Percentile Extinction Value (Mm^{-1})	Distance (mi)
	Rank	Facility	ORIS ID	Unit IDs	Meteorological Year			Maximum Impact for Meteorological Years 2002, 2011, 2015	
					Est. 2002	Est. 2011	Modeled 2015		
Acadia	10	Newington	8002	1	**2.8**	2.5	2.8	**2.7**	152
Lye Brook	7	Merrimack	2364	2	1.6	**3.3**	0.7	**11.0**	79

NHDES also performed CALPUFF screening on several other New Hampshire emission sources. The selection of emission units for modeling were based on the MANE-VU EGU and peaking unit criteria, the MANE-VU ICI facility criteria, and requests from EPA and the National Park Service through consultation. All New Hampshire emission units modeled are listed in Table 2-6 and those requested by EPA and the FLM are shown in **blue** text.

Table 2-6 summarizes the estimated emission impact of all New Hampshire EGUs, combustion turbines and major ICI emission units on MANE-VU Class I areas in the region. This documents the modeled impact of New Hampshire emission sources on nearby Class I areas in Maine and Vermont, as well as the more distant New Jersey. Extinction values presented are the maximum from modeling with three years of meteorology (2002, 2011, and 2015). Large EGU emissions are based on the 95th percentile of 2015 emissions as provided by the EPA's CAMD database. Other units' emissions are based on current permitted or highest daily actual emissions from 2016-2018, as indicated.

Table 2-6: New Hampshire Visibility Impairing EGU and ICI Point Sources

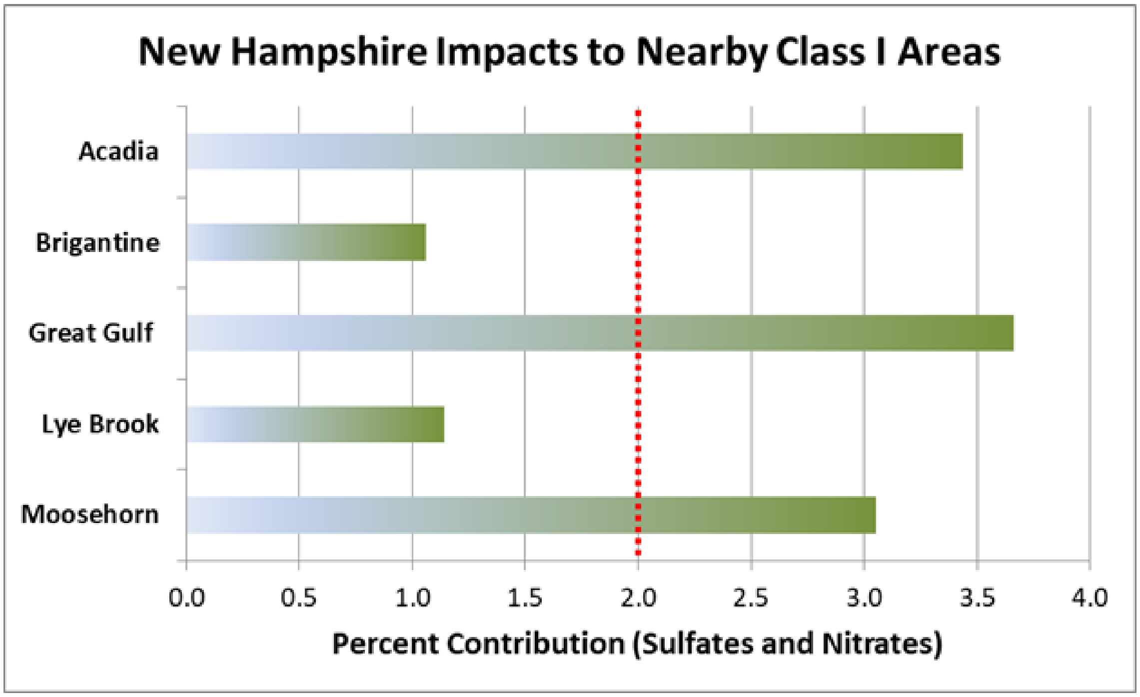
Facility Information			Extinction Value (Mm^{-1})					
Facility	**Emissions**	**Unit IDs**	**Acadia**	**Brigantine**	**Great Gulf**	**Lye Brook**	**Moosehorn**	**Presidential**
APC Paper	b	EU01	0.01	0.00	0.01	0.02	0.00	0.01
APC Paper	b	EU02	0.01	0.00	0.01	0.02	0.00	0.01
Burgess BioPower	b	EU01	0.07	0.05	0.83	0.14	0.08	0.68
Dartmouth College	b	EU01	0.08	0.02	0.09	0.25	0.04	0.10
Dartmouth College	b	EU02	0.09	0.03	0.11	0.30	0.05	0.12
Dartmouth College	b	EU03	0.09	0.03	0.11	0.29	0.05	0.12
Dartmouth College	b	EU04	0.08	0.03	0.10	0.28	0.04	0.11
E.P. Newington	b	EU01	0.15	0.04	0.12	0.14	0.08	0.15
E.P. Newington	b	EU02	0.15	0.04	0.12	0.14	0.08	0.15
Gorham Paper & Tissue LLC	c	EU01	0.02	0.01	0.20	0.03	0.02	0.15
Gorham Paper & Tissue LLC	c	EU02	0.02	0.01	0.19	0.03	0.02	0.13
Gorham Paper & Tissue LLC	c	EU09	0.00	0.00	0.02	0.00	0.00	0.01
Granite Ridge Energy	b	EU01	0.03	0.01	0.03	0.06	0.02	0.04
Granite Ridge Energy	b	EU02	0.04	0.01	0.03	0.07	0.03	0.04
Lost Nation	b	LNCT1	0.20	0.08	1.20	0.20	0.17	1.87
Merrimack Station	a	MK1	0.65	0.39	1.16	1.28	0.38	1.27
Merrimack Station	a	MK2	1.69	0.97	2.89	3.28	1.00	3.15
Merrimack Station	b	MKCT1	0.37	0.11	0.30	0.55	0.18	0.42
Merrimack Station	b	MKCT2	0.36	0.11	0.28	0.53	0.17	0.41
Monadnock Paper	d	EU01	0.04	0.02	0.04	0.07	0.03	0.05
Monadnock Paper	d	EU02	0.04	0.02	0.04	0.07	0.03	0.05
Newington Station	a	NT1	2.85	0.93	2.18	2.55	2.06	2.66
Stored Solar Tamworth	b	Wood	0.22	0.08	0.66	0.25	0.17	1.05
Schiller Station	a	SR4	1.15	0.28	0.71	0.43	0.95	0.84
Schiller Station (NWPP)	b	SR5	0.28	0.07	0.17	0.11	0.24	0.21
Schiller Station	a	SR6	1.12	0.26	0.67	0.42	0.91	0.79
Schiller Station	b	SRCT	0.50	0.14	0.44	0.42	0.28	0.55
Wheelabrator Concord	b	EU01	0.08	0.04	0.10	0.18	0.04	0.14
Wheelabrator Concord	b	EU02	0.08	0.04	0.10	0.18	0.04	0.14
White Lake	b	WLCT1	0.38	0.10	0.97	0.42	0.28	2.20

a 2015 95th percentile daily emissions
b Current permitted emissions
c Highest daily actual emissions from 2016, 2017, 2018
d Permitted potential rate with actual fuel use

EGUs at Merrimack and Newington are the primary impairing point sources in New Hampshire. All of the New Hampshire sources listed in Table 2-6 which have maximum estimated visibility extinction above 1 Mm^{-1} at federal Class I areas were included in the list of New Hampshire sources for further analysis. The analysis is detailed in Section 4.2.

Figure 2-7 shows the percent mass-weighted sulfate and nitrate contributions from New Hampshire to Federal Class I areas. If a state was estimated to contribute 2% or more (mass-weighted sulfate and nitrate contributions) at any of the five Federal Class I areas it was considered to be a contributing state, and subject to consultation. New Hampshire's emissions result in high enough impact at Acadia and Moosehorn in Maine to qualify as a contributing state.

Figure 2-7: Percent Mass-Weighted Sulfate and Nitrate Contribution to Federal Class I Areas from New Hampshire

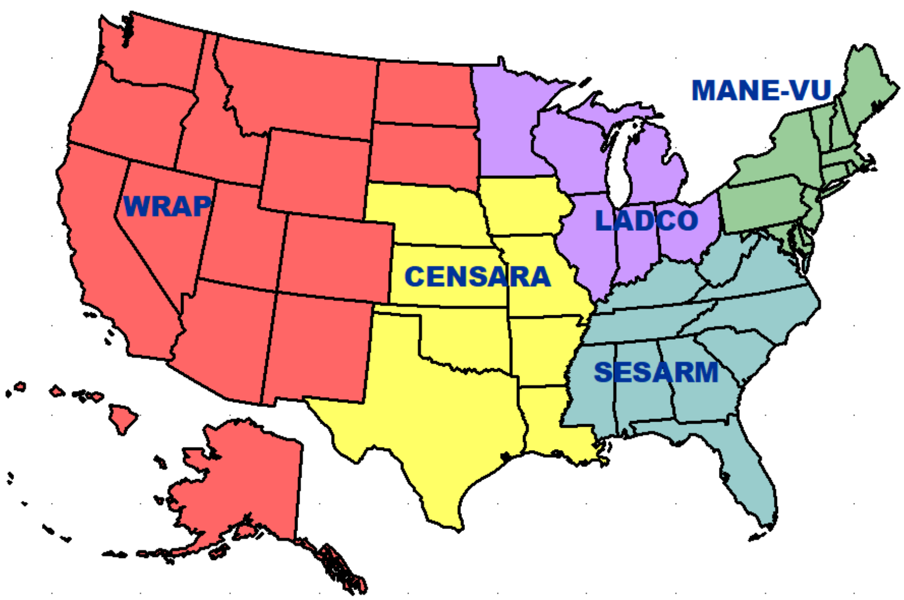


The National Park Service recently reevaluated four New Hampshire sources (for which they had previously requested NHDES conduct additional review) to determine the emission impacts of these sources on Acadia in Maine. This evaluation compared emission impacts utilizing more recent emission information from both the 2014 National Emissions Inventory (NEI) / 2017 CAMD data and the 2017 NEI / 2020 CAMD data. The reevaluation resulted in a decrease in impacts to Acadia such that the two EGU sources (Merrimack and Schiller) no longer exceeded the 1 Mm^{-1} threshold. This can be attributed in part to the decrease in operations of these sources over the past few years. The other two sources of specific interest to the National Park Service were Burgess BioPower and Wheelabrator Concord. While both of these sources were already modeled with a maximum estimated visibility extinction below the 1 Mm^{-1} threshold as shown in Table 2-6, New Hampshire also included these facilities in the list of New Hampshire sources for further analysis as detailed in Section 4.2.

3 REGIONAL PLANNING AND CONSULTATION

In accordance with 40 CFR §51.308(f)(2)(ii) New Hampshire must consult with states that have emissions that are reasonably anticipated to contribute to visibility impairment in the mandatory Federal Class I areas. Because the pollutants that lead to regional haze can originate from sources located across broad geographic areas, EPA has encouraged the states and tribes across the U.S. to address visibility impairment from a regional perspective. In 1999, EPA and affected states/tribes agreed to create five Regional Planning Organizations (RPOs) to facilitate interstate coordination on SIPs addressing regional haze. The RPOs, and states/tribes within each RPO, are required to consult on emission management strategies toward visibility improvement in affected Federal Class I areas. As shown in Figure 3-1, the five RPOs were originally called MANE-VU, Visibility Improvement State and Tribal Association of the Southeast (VISTAS), Midwest Regional Planning Organization (MRPO), Central Regional Air Planning Association (CenRAP), and Western Regional Air Partnership (WRAP). MRPO, VISTAS and CenRAP operations have been absorbed into their parent organizations Lake Michigan Air Directors Consortium (LADCO), Southeastern Air Pollution Control Agencies (SESARM) and Central States Air Resource Agencies (CENSARA), respectively. New Hampshire is a member of MANE-VU.

Figure 3-1: Regional Planning Organizations



These RPOs evaluate technical information to better understand how their states and tribes impact national parks and wilderness areas (Federal Class I areas) across the country, pursue the development of regional strategies to reduce emissions of particulate matter and other pollutants leading to regional haze, and help states meet the consultation requirements of the Regional Haze Rule.

3.1 Mid-Atlantic / Northeast Visibility Union (MANE-VU)

MANE-VU's work is managed by the Ozone Transport Commission (OTC) and carried out by OTC, MARAMA, and Northeast States for Coordinated Air Use Management (NESCAUM). The states, tribes and federal agencies comprising MANE-VU are listed in Table 3-1. Individuals from the member states, tribes and agencies, along with professional staff from OTC, MARAMA and NESCAUM, make up the various committees and workgroups. MANE-VU also established a Policy Advisory Group (PAG) to provide advice to decision-makers on policy questions. To fulfill the PAG function, state and tribal Air Directors meet on an as-needed basis with EPA and the FLM.

Table 3-1: MANE-VU Members

- Connecticut
- Delaware
- Maine
- Maryland
- Massachusetts
- New Hampshire
- New Jersey
- New York
- Pennsylvania
- Rhode Island
- Vermont
- District of Columbia
- Penobscot Nation
- St. Regis Mohawk Tribe
- U.S. Environmental Protection Agency*
- U.S. Fish and Wildlife Service*
- U.S. Forest Service*
- U.S. National Park Service*~

**Non-voting members*
~Also represents the U.S. portion of Roosevelt Campobello International Park

Since its inception on July 24, 2001, MANE-VU has employed an active committee structure to address both technical and non-technical issues related to regional haze. The primary committee is the MANE-VU TSC. While the work of the MANE-VU TSC is instrumental to policies and programs, all policy is reviewed by the MANE-VU Air Directors and decisions are ultimately made by the MANE-VU Board.

The MANE-VU TSC is charged with assessing the nature and magnitude of regional haze within MANE-VU, interpreting the results of technical work, and reporting on such work to the MANE-VU Board. This committee has evolved to function as a valuable resource on all technical projects and issues for MANE-VU. The MANE-VU TSC has established a process to ensure that important regional-haze-related projects are completed in a timely fashion, and members are kept informed of all MANE-VU tasks and duties. In addition to the formal working committees, ad hoc workgroups of the MANE-VU TSC may be used for purposes of evaluating emissions, monitoring and modeling.

The Communications Committee is charged with developing approaches to inform the public about regional haze and making recommendations to the MANE-VU Board to facilitate that goal. This committee oversees the production of MANE-VU's newsletter and outreach tools, for both stakeholders and the public, regarding regional issues affecting MANE-VU's members.

3.2 Regional Consultation and the "Ask"

On May 10, 2006, MANE-VU adopted the Inter-RPO State/Tribal and FLM Consultation Framework [27] whose purpose is to "...delineate, by consensus, the basic consultation requirements for states, tribes, RPOs, and FLMs required under 40 CFR Part 51, during the regional haze SIP development process." The basic principles set forth in the framework are presented in Table 3-2. The MANE-VU states and tribes applied these principles to the regional haze consultation and SIP development process. Issues addressed included regional haze baseline assessments, natural background levels, and development of RPGs. These are described at length in later sections of this SIP.

[27] MANE-VU, (May 2006). *Inter-RPO State/Tribal and FLM Consultation Framework*. Appendix F.

Table 3-2: MANE-VU Consultation Principles for Regional Haze Planning

1.	All State, Tribal, RPO, and Federal participants are committed to continuing dialogue and information sharing in order to create understanding of the respective concerns and needs of the parties.
2.	Continuous documentation of all communications is necessary to develop a record for inclusion in the SIP submittal to EPA.
3.	States alone have the authority to undertake specific measures under their SIP. This inter-RPO framework is designed solely to facilitate needed communication, coordination and cooperation among jurisdictions but does not establish binding obligation on the part of participating agencies.
4.	There are two areas that require State-to-State and/or State-to-Tribal consultations ("formal" consultations): (i) development of the reasonable progress goal for a Class I area, and (ii) development of long-term strategies. While it is anticipated that the formal consultation will cover the technical components that make up each of these policy decision areas, there may be a need for the RPOs, in coordination with their State and Tribal members, to have informal consultations on these technical considerations.
5.	During both the formal and informal inter-RPO consultations, it is anticipated that the States and Tribes will work collectively to facilitate the consultation process through their respective RPOs, when feasible.
6.	Technical analyses will be transparent, when possible, and will reflect the most up-to-date information and best scientific methods for the decision needed within the resources available.
7.	The State with the Class I area retains the responsibility to establish reasonable progress goals. The RPOs will make reasonable efforts to facilitate the development of a consensus among the State with a Class I area and other States affecting that area. In instances where the State with the Class I area cannot agree with such other States that the goal provides for reasonable progress, actions taken to resolve the disagreement must be included in the State's regional haze implementation plan (or plan revisions) submitted to the EPA Administrator as required under 40 CFR §51.308(d)(1)(iv).
8.	All States whose emissions are reasonably anticipated to contribute to visibility impairment in a Class I area, must provide the FLM agency for that Class I area with an opportunity for consultation, in person, on their regional haze implementation plans. The States/Tribes will pursue the development of a memorandum of understanding to expedite the submission and consideration of the FLMs' comments on the reasonable progress goals and related implementation plans. As required under 40 CFR §51.308(i)(3), the plan or plan revision must include a description of how the State addressed any FLM comments.
9.	States/Tribes will consult with the affected FLMs to protect the air resources of the State/Tribe and Class I areas in accordance with the FLM coordination requirements specified in 40 CFR §51.308(i) and other consultation procedures developed by consensus.
10.	The consultation process is designed to share information, define and document issues, develop a range of options, solicit feedback on options, develop consensus advice if possible, and facilitate informed decisions by the Class I States.
11.	The collaborators, including States, Tribes and affected FLMs, will promptly respond to other RPOs/States'/Tribes' requests for comments.

Through this process, New Hampshire consulted with other states by participating in the MANE-VU intra-RPO, inter-RPO, and EPA/FLM consultations that led to the creation of coordinated strategies, or "Asks" on regional haze. These strategies were consolidated in three "Ask" statements that identify a recommended course of action for: a) states within MANE-VU; b) states outside of MANE-VU; and c) the EPA and FLM for the current regional haze planning period, 2018-2028. Each of these "Ask" statements are further described in Section 4.2 of this document. All MANE-VU states participated in the MANE-VU Intra-RPO consultations, as did FLM represented by the National Park Service, the U.S. Forest Service and the U.S. Fish and Wildlife Service. A summary of the consultations is found in Appendix G.[28]

[28] MANE-VU TSC, (July 2018). *MANE-VU Regional Haze Consultation Report*. Appendix G.

3.2.1 Selections of States for MANE-VU Inter-RPO Regional Haze Consultation

As described earlier in Section 2, MANE-VU used two primary screening tools to assess the impact of MANE-VU emissions sources to Class I areas outside of MANE-VU, and to assess the impact of emission sources outside of MANE-VU to MANE-VU Class I areas. As discussed in Section 2, these tools consisted of a CALPUFF modeling analysis done by NHDES and VTDEC and an adjusted Q/d analysis performed by CTDEEP. To minimize any uncertainties that might be associated with these individual methods, MANE-VU used the results from the individual analyses in a relative sense to determine which upwind states were necessary to consult with. This process is documented in MANE-VU's Selection of States for MANE-VU Regional Haze Consultation report.[29] In the MANE-VU selection of states report, MANE-VU used the CALPUFF and Q/d results to derive an average relative contribution, in percent, for each state in the OTC modeling domain to each MANE-VU Class I area.

MANE-VU chose a relative contribution threshold of 2% or more to select states for consultation. The origin of the 2% threshold is EPA's 1% threshold for determining whether an upwind state contributes to National Ambient Air Quality Standard (NAAQS) nonattainment in a downwind state. Given the uncertainty associated with adapting a NAAQS contribution threshold to a threshold for visibility impairment, MANE-VU and New Hampshire chose a slightly higher 2% threshold to avoid including states that are not reasonably anticipated to contribute to visibility impairment at a MANE-VU Class I area.

The average relative contribution results, as described in the MANE-VU selection of states report, lead to the 14 upwind states in three upwind RPOs with whom MANE-VU considered necessary to consult as shown in Table 3-3. States specifically identified for New Hampshire consultation are listed in **blue** type. A visual representation for contributing states for Great Gulf is given in Figure 3-2.

Table 3-3: State in Each Upwind RPO that are Considered Contributing to a MANE-VU Class I Area

MRPO	**Illinois**	**Indiana**	**Michigan**	**Ohio**			
VISTAS	Alabama	Florida	**Kentucky**	**N. Carolina**	Tennessee	**Virginia**	**W. Virginia**
CENRAP	**Louisiana**	**Missouri**	**Texas**				

29 MANE-VU TSC, (September 2017). *Selection of States for MANE-VU Regional Haze Consultation (2018)*. Appendix E.

Figure 3-2: States Contributing to Visibility Impairment at Great Gulf Based on Mass Weighting Analysis

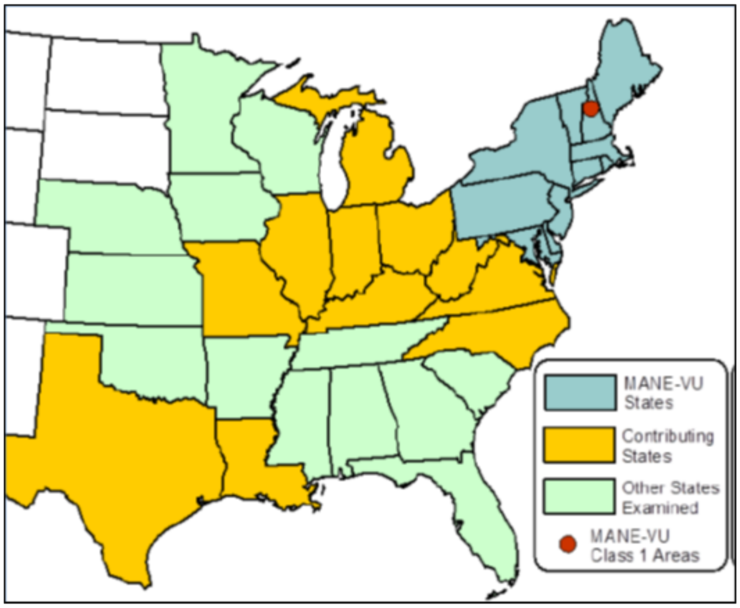
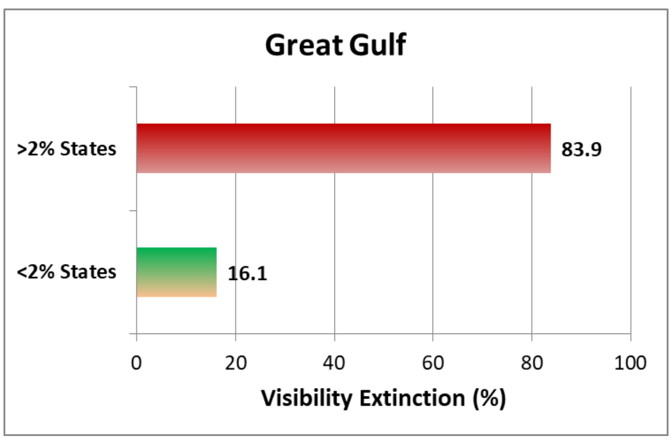


Figure 3-3 shows that the states identified for consultation with New Hampshire represent approximately 84% of the visibility extinction at Great Gulf due to sulfates and nitrates from analyzed state emissions.

Figure 3-3: Estimated Visibility Extinction at Great Gulf Due to Sulfates and Nitrates from Assessed States



Figures 3-4 and 3-5 show NEI and Air Markets Program Data (AMPD) emission inventories for the MANE-VU states and other states invited for consultation with New Hampshire and MANE-VU.

Figure 3-4: 2014 NEI Statewide NOx and SO_2 Emissions for States Selected by MANE-VU for Consultation

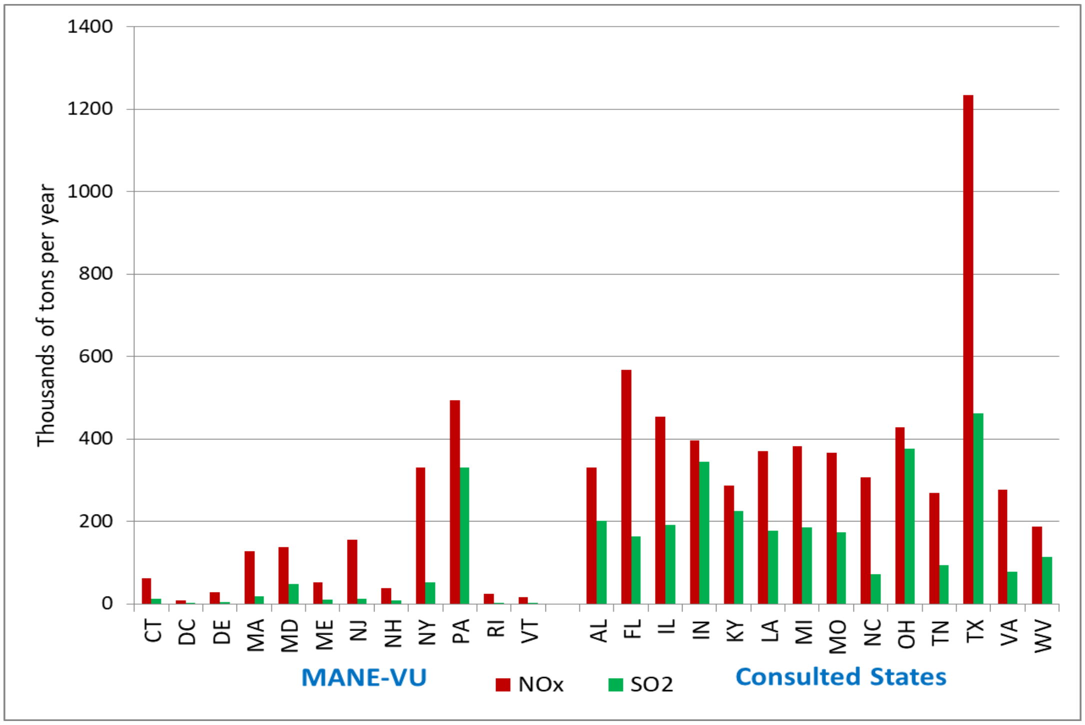
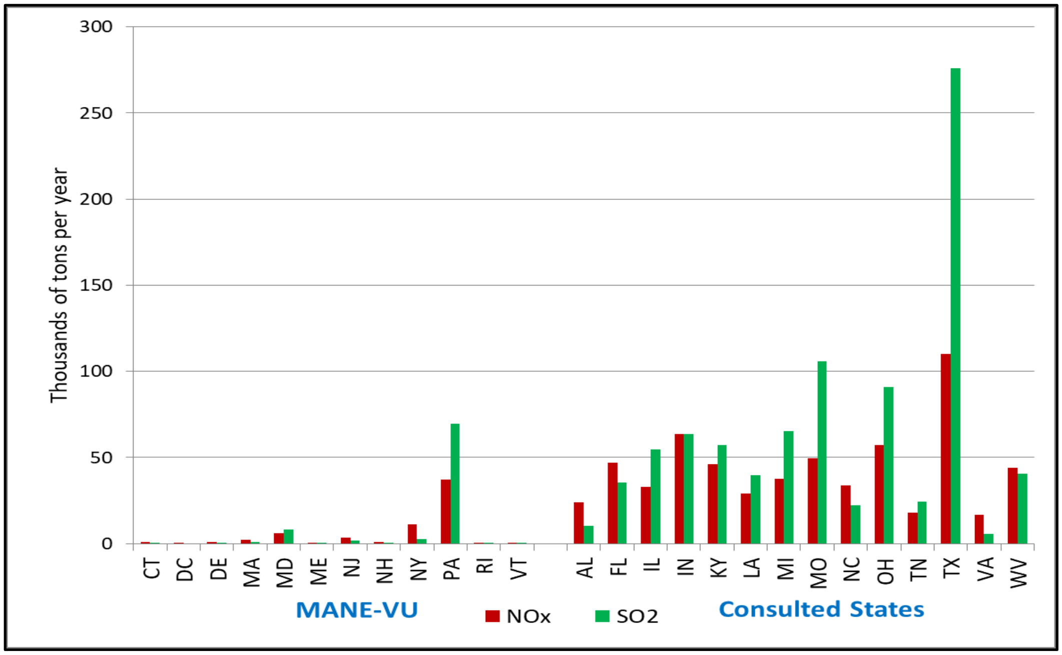


Figure 3-5: 2017 AMPD Sources NOx and SO_2 Emissions for States Selected by MANE-VU for Consultation



3.2.2 New Hampshire Specific Consultation

40 CFR §51.308(f)(2)(ii) of the Regional Haze Rule requires the State of New Hampshire to consult with other states/tribes to develop coordinated emission management strategies. This requirement applies both when emissions from a state/tribe are reasonably anticipated to contribute to visibility impairment in Federal Class I areas outside the state/tribe and when emissions from other states/tribes are reasonably anticipated to contribute to visibility impairment at mandatory Federal Class I areas within a state/tribe.

New Hampshire consulted with other states/tribes by participating in the MANE-VU intra-RPO and inter-RPO processes leading to the creation of coordinated strategies on regional haze. This coordinated effort considered the individual and aggregated impacts of states'/tribes' emissions on Federal Class I areas within and outside the states/tribes.

To maintain consistency within MANE-VU, every MANE-VU member was requested to consult with New Hampshire. Several states outside MANE-VU were also requested to join this consultation in response to the findings of MANE-VU's evaluations. All MANE-VU states with Federal Class I areas have similarly requested consultation with New Hampshire on the regional haze issue.

Throughout the consultation process, New Hampshire was guided by the principles contained in a resolution adopted by the MANE-VU Class I states on June 7, 2007 (Table 3-2). In the resolution, the Class I states agreed to set RPGs for 2028 that would provide visibility improvement at least as great as that which would be achieved under a URP to reach natural visibility conditions by 2064. The goals would be set by the Class I states at levels reflecting implementation of measures determined to be reasonable after consultation with the contributing states. At the same time, the Class I states recognized that each state should be given the flexibility to choose other measures that achieve the same or greater benefits.

The results of New Hampshire's consultation efforts will ultimately rest with the individual states and the EPA as they develop and implement their own regional haze SIPs. The other MANE-VU states have agreed to incorporate certain control measures into their SIPs, but most of these plans are still under development. For the non-MANE-VU states, New Hampshire has the expectation that the same or equivalent control measures will be included in those states plans.

4 PERIODIC COMPREHENSIVE REVISION

The Regional Haze Rule at 40 CFR §51.308(f) outlines the requirements for periodic comprehensive revisions of the implementation plans for regional haze, specifying that each applicable state revise and submit its regional haze implementation plan revision to EPA by July 31, 2021, July 31, 2028 and every ten years thereafter.

4.1 Ambient Data Analysis - Calculations of Baseline, Current and Natural Visibility

40 CFR §51.308(f)(1) of the Regional Haze Rule as outlined in Step 1 of EPA's 2019 Guidance document requires states to address regional haze in each mandatory Federal Class I area located within the State. Specifically, the plan must contain:

- Baseline, natural and current visibility conditions for the most impaired and clearest days. These six conditions must be quantified in dv.
- Actual progress made on the most impaired and clearest days toward natural visibility conditions (1) since the baseline period and (2) in the previous implementation period. These four calculations must be quantified in dv.
- The difference between current and natural visibility conditions for the most impaired and clearest days. These two calculations must be quantified in dv.
- The URP for the most impaired days between baseline visibility conditions and natural visibility conditions. The URP must be quantified in dv per year.

For the first implementation period, states selected the least and most impaired days as the monitored days with the lowest and highest actual dv levels regardless of the source of the particulate matter causing the visibility impairment. EPA, in its Regional Haze Rule revision, stated that focusing on anthropogenic impairment is a more appropriate method for determining most impaired days because it will more effectively track whether states are making progress in controlling anthropogenic sources. This approach is also more consistent with the definition of visibility impairment in 40 CFR §51.301 and with the national goal established in the CAA. While not changing the wording, EPA made clear that going forward, most impaired days would refer to those with the greatest anthropogenic visibility impairment. The approach for the 20% of days with the best visibility to represent good visibility conditions for RPG and tracking purposes would remain the same but would instead be referred to as the 20% clearest days rather than the 20% least impaired days.

EPA's 2018 Technical Guidance method to track changes in visibility for the 20% most impaired days to the baseline (2000-2004) and current (2015-2019) visibility levels shows values for both the updated definition to calculate most impaired days and the method used to calculate 20% worst days in the first Regional Haze report, that included contributions from non-anthropogenic sources. Because the Great Gulf IMPROVE monitor did not have sufficient data collection during 2000 to be considered a complete year, the monitoring data for the period of 2001 to 2004 was used to establish the Great Gulf baseline as required under EPA revised guidance[30]. Methods are the same for the 20% best and 20% clearest days. Regional haze data from the following databases for 2000-2019 were downloaded from the Federal Land

[30] EPA, (June 2020). *Visibility and Haze Memo and Technical Addendum on Ambient Data Usage and Completeness for the Regional Haze Program*. Available at: https://www.epa.gov/visibility/memo-and-technical-addendum-ambient-data-usage-and-completeness-regional-haze-program.

Manager Environmental Database (FED)[31] for all Federal Class I areas listed in Section 2.1:

- IMPROVE AEROSOL, RHR II (New Equation).
- IMPROVE Natural Conditions II, Baseline (01-05).

Visibility monitoring at Great Gulf Wilderness and Presidential Range - Dry River Wilderness is accomplished with instruments located at Camp Dodge. This monitoring station, which represents both New Hampshire wilderness areas, measures and records light scattering, aerosols, and relative humidity. The collected data are compiled and sorted to ascertain visibility levels on the 20% clearest and most impaired days. This information is tracked over time to look for trends.

4.1.1 Baseline, Natural and Current Visibility Conditions for the Most Impaired and Clearest Days

The 2000-2004 baseline visibility for the Great Gulf and Presidential Range - Dry River Wilderness Class I areas was 7.65 dv for the 20% clearest days and 21.88 dv for the 20% most impaired days and was calculated in accordance with EPA's June 2020 memorandum regarding data completeness. These are average values based on data collected at the Great Gulf (GRGU) IMPROVE monitoring site at Camp Dodge. New Hampshire accepts designation of this monitoring site as representative of the Great Gulf and Presidential Range - Dry River Wilderness Areas in accordance with 40 CFR §51.308(d)(2)(i). (The Presidential Range – Dry River Wilderness Area is close enough to the monitoring site to be representative of both.)

Table 4-1 lists the baseline visibility for the 20% clearest and 20% most impaired days for each year of the period 2000-2004, from which the valid five-year average values in Table 1-2 were calculated in accordance with 40 CFR §51.308(d)(2). The dv visibility values for best days were calculated as detailed in the NESCAUM Baseline and Natural Background document.[32] Most impaired days were calculated using the updated method from the EPA guidance. The 20% best and worst visibility days (i.e., including non-anthropogenic contributions) are included in the table for comparison.

Natural visibility conditions refer to the visibility conditions that existed before human activities affected air quality in the region. Consistent with the stated visibility goals of the CAA, natural visibility conditions are identified as the visibility target to be reached in each Federal Class I area.

31 Federal Land Manager Environmental Database. Available at: http://views.cira.colostate.edu/fed/.

32 NESCAUM, (December 2006). *Baseline and Natural Background Visibility Conditions: Considerations and Proposed Approach to the Calculation of Baseline and Natural Background Visibility Conditions at MANE-VU Class I Areas*. Appendix I.

Table 4-1: Baseline Visibility for the 20% Clearest and 20% Worst Days for the Baseline Period in New Hampshire Class I Areas[33]

Federal Class I Area(s)	Year	Baseline Visibility (dv)			
		20% Best	20% Worst	20% Clearest	20% Most Impaired
Great Gulf Wilderness and Presidential Range - Dry River Wilderness	2000[34]	--	--	--	--
	2001	8.26	23.29	8.26	22.47
	2002	7.77	24.84	7.77	23.43
	2003	6.94	21.69	6.94	20.65
	2004	7.61	21.56	7.61	20.97
	4-yr Average[35]	**7.65**	**22.84**	**7.65**	**21.88**

The Great Gulf and Presidential Range - Dry River Wilderness Class I areas have an estimated natural background visibility of 3.73 dv on the 20% clearest days and 9.78 dv on the 20% most impaired days. These values were calculated using the EPA guideline and approved alternative method described in NESCAUM's Baseline and Natural Background document.[36]

According to 40 CFR §51.308(f)(1)(iii), the period for calculating the current visibility conditions is the most recent 5-year period for which data are available. The current visibility condition for the most impaired or the clearest days is the average of the respective annual values. This is shown in Table 4-2. Table 4-3 shows the comparison between natural, baseline and current visibility.

Table 4-2: Current Visibility for the 20% Clearest and 20% Most Impaired Days during 2015-2019 in New Hampshire Class I Areas

Federal Class I Area(s)	Year	Current Visibility (dv)	
		20% Clearest	20% Most impaired
Great Gulf Wilderness and Presidential Range - Dry River Wilderness	2015	4.92	14.44
	2016	4.69	11.23
	2017	5.22	11.81
	2018	4.36	12.70
	2019	4.30	11.47
	5-yr Average	**4.69**	**12.33**

Table 4-3: Comparison of Natural, Baseline, and Current Visibility for the 20% Clearest and 20% Most Impaired Days in New Hampshire Class I Areas

Period	Visibility (dv)	
	20% Clearest	20% Most impaired
Baseline (2000-2004)	7.65	21.88
Current (2015-2019)	4.69	12.33
Natural	3.73	9.78

33 Data source for Tables 4-1, 4-2, 4-3 and 4-4: Appendix B.

34 Insufficient number of data points for this year. Average is based on complete 4-year period (2001-2004).

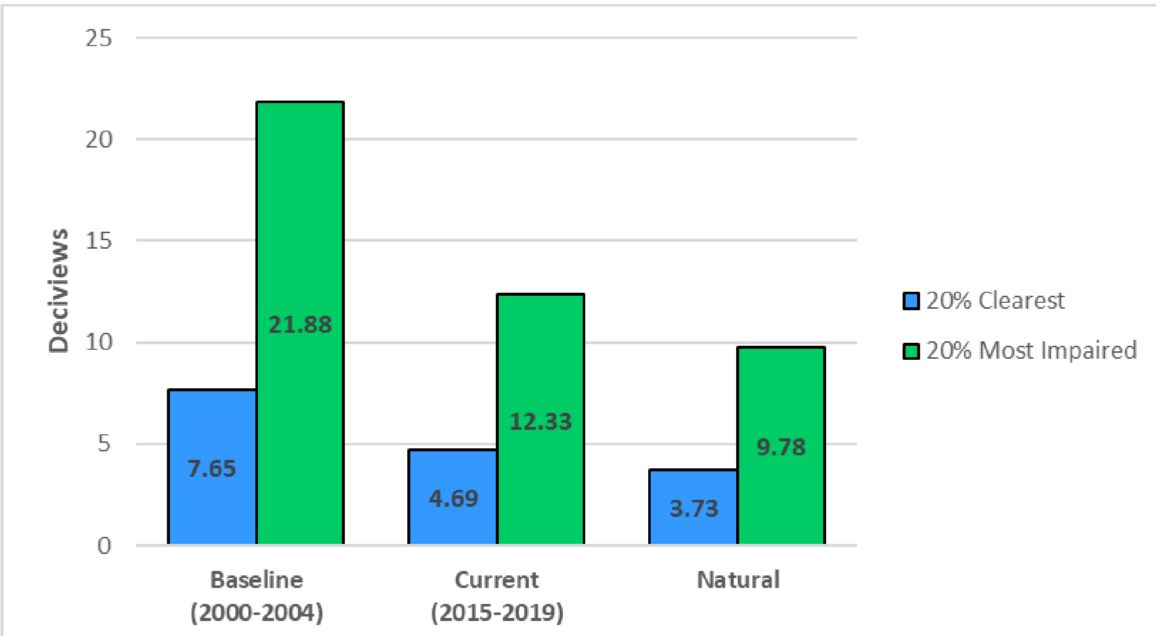
35 According to EPA guidance, because the Great Gulf IMPROVE monitor did not have sufficient data collection during 2000 to be considered a complete year, the monitoring data for the period of 2001 to 2004 was used to establish the Great Gulf baseline.

36 NESCAUM, (December 2006). *Baseline and Natural Background Visibility Conditions: Considerations and Proposed Approach to the Calculation of Baseline and Natural Background Visibility Conditions at MANE-VU Class I Areas*. Appendix I.

4.1.2 Progress to Date for the Most Impaired and Clearest Days

Actual progress made towards the natural visibility condition since the baseline period, and actual progress made during the previous implementation period for both the most impaired and the clearest days represents progress to date. IMPROVE data for 2019 represents the most recent available and thus the period of 2015 to 2019 is the most recent 5-year period available. Current conditions reflect a 9.55 dv improvement from Baseline on the 20% most impaired days and 2.96 dv on the 20% clearest days. This is illustrated in Figure 4-1.

Figure 4-1: Baseline, Current, and Natural Visibility Conditions for the Great Gulf Wilderness/Presidential Range-Dry River Wilderness Areas (dv)



4.1.3 Differences between Current Visibility Condition and Natural Visibility Condition

As of the most recent 5-year period (2015-2019), the current visibility condition in the Great Gulf Wilderness/Presidential Range-Dry River Wilderness exceeds natural visibility condition by 0.96 dv on the 20% clearest days and by 2.55 dv on the 20% most impaired days (Table 4-4).

Table 4-4: Current Visibility (2015-2019) vs. Natural Visibility Conditions (dv)

Federal Class I Area(s)	Year	Current Visibility		Natural Visibility	
		20% Clearest	20% Most Impaired	20% Clearest	20% Most Impaired
Great Gulf Wilderness and Presidential Range - Dry River Wilderness	2015	4.92	14.44	**3.73**	**9.78**
	2016	4.69	11.23		
	2017	5.22	11.81		
	2018	4.36	12.70		
	2019	4.30	11.47		
				Difference	
	Average	**4.69**	**12.33**	**0.96**	**2.55**

4.1.4 Uniform Rate of Progress (URP)

The URP measure defines, in deciviews per year, the rate of visibility improvement that would have to be maintained in order to attain natural visibility conditions by the end of 2064. This measure is called the URP line or glide path between baseline conditions and 2064. In its 2011 Regional Haze Plan for the first planning period to 2018, New Hampshire's calculations showed that rate to be 0.180 dv per year (Table 4-5), and stated that the RPGs established for the Great Gulf/ Presidential Range-Dry River Wilderness Areas were expected to provide visibility improvements in excess of that rate.[37]

Table 4-5: Uniform Rate of Progress from 2011 SIP (dv)

Federal Class I Area(s)	2000-2004 Baseline Visibility (20% Worst Days)	Natural Visibility (20% Worst Days)	Total Improvement Needed by 2028	Total Improvement Needed by 2064	Uniform Annual Rate of Improvement
Great Gulf Wilderness and Presidential Range - Dry River Wilderness	22.8	12.0	2.5	10.8	0.180

For the second implementation period (2018-2028), the monitoring data for the period of 2001 to 2004 was used to establish the Great Gulf baseline information (2000-2004) as required under EPA revised guidance. The baseline for 20% most impaired days is 21.88 dv and for 20% clearest days it is 7.65 dv (Table 4-6). The new rate of reasonable progress for the 20% most impaired days is 0.202 dv per year.

Table 4-6: Baseline, Current and Reasonable Progress Goal Haze Index Levels for New Hampshire's Class I Areas[38]

Federal Class I Area(s)	IMPROVE SITE DATA CODE(S)	State	CLEAREST DAYS			MOST IMPAIRED DAYS				
			Baseline (2000-04) (dv)	Current (2015-19) (dv)	RPG (2028) (dv)	Baseline (2000-04) (dv)	Current (2015-19) (dv)	Rate URP[a] 2064 (dv/yr)	URP[b] 2028 (dv)	RPG (2028) (dv)
Great Gulf Wilderness Area and Presidential Range/Dry River Wilderness Area	GRGU	NH	7.65	4.69	5.06[c] 5.11[d]	21.88	12.33	0.202	17.04	12.00[c] 12.13[d]

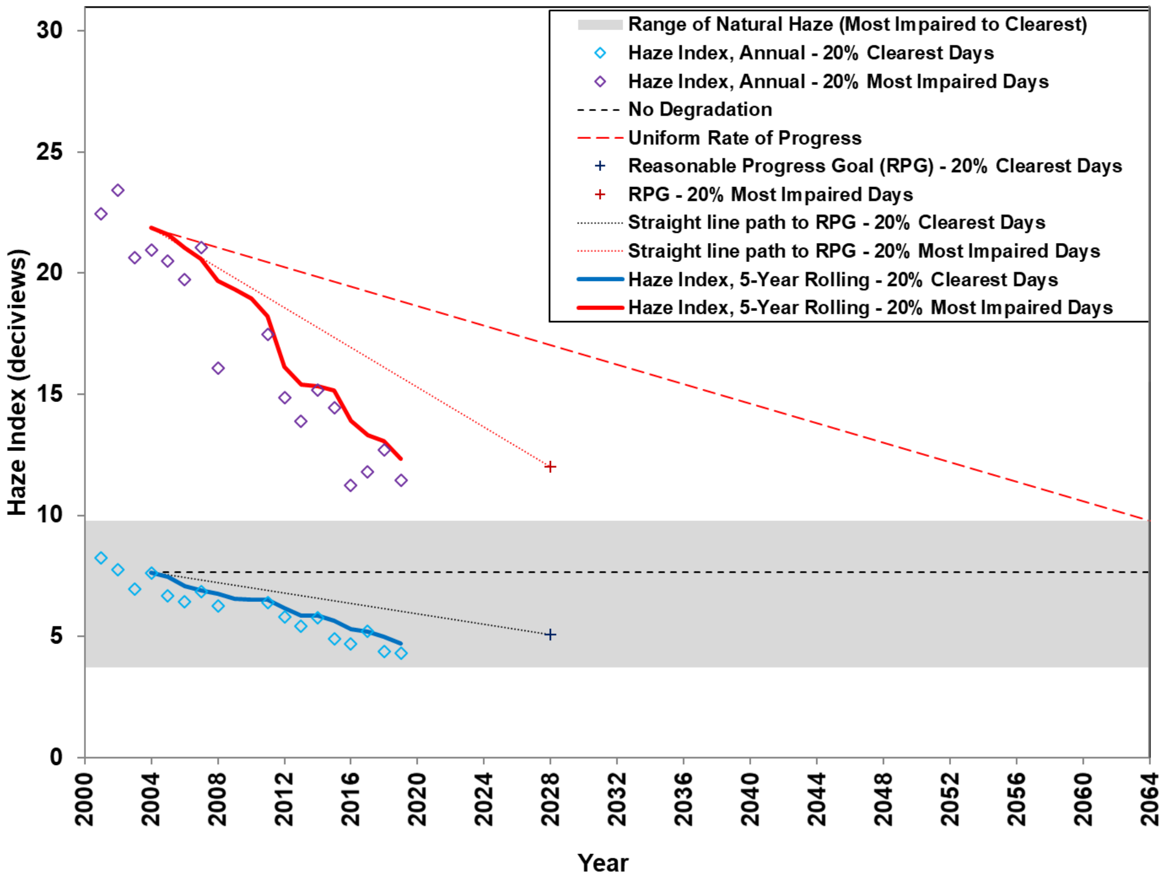
[a] URP, dv improvement per year required to meet 20% most impaired Natural Conditions
[b] URP level if URP is maintained
[c] Modeled with MANE-VU "Ask" measures
[d] Modeled without MANE-VU "Ask" measures

As shown in in Table 4-6 and in Figure 4-2, the Great Gulf/Presidential-Dry River Wilderness Area is well below the 2018 URP level for the first SIP planning period, and is currently below the 2028 URP level for the second SIP planning period.

[37] NESCAUM, (December 2006). *Baseline and Natural Background Visibility Conditions: Considerations and Proposed Approach to the Calculation of Baseline and Natural Background Visibility Conditions at MANE-VU Class I Areas*. Appendix I.

[38] Data source for Table 4-6: Appendix B and Appendix U.

Figure 4-2: Visibility Metrics Levels at Great Gulf/Presidential-Dry River Wilderness Areas [39]



4.2 Long-Term Strategy (LTS) for Regional Haze

According to 40 CFR §51.308(f)(2), states must submit a LTS that addresses regional haze visibility impairment for each mandatory Federal Class I area within the State and for each Federal Class I area located outside the State that may be affected by emissions from the State. The first step in developing a LTS is for the state to identify which sources within the state that will be considered in the analysis (see Section 4.2.1).

Next, the state must evaluate and determine the emission reduction measures that are necessary to make reasonable progress in visibility improvement. This assessment must consider four factors: the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources. The LTS must document how the four factors were taken into consideration in selecting the measures for inclusion. New Hampshire utilized the MANE-VU "Asks" as the starting point for assessing source categories and associated emission reduction measures. Sections 4.2.2 through 4.2.6 outline how the four factors were taken into consideration by MANE-VU in the development of the "Asks". New Hampshire not only incorporated the MANE-VU "Asks" into the LTS analysis, but applied the "Asks" to a broader group of New Hampshire sources and requested four-factor analyses from specific source categories. (see Section 4.2.9)

[39] MANE-VU, (January 2020 revision). *Mid-Atlantic/Northeast U.S. Visibility Data 2004-2019 (2nd RH SIP Metrics)*, Appendix B.

In accordance with §51.308(f)(2)(iv) of the Regional Haze Rule, New Hampshire also considered five additional factors in developing its LTS. (see Section 4.2.8)

40 CFR §51.308(f)(2)(iii) requires states to document the technical bases on which they are relying to determine the emission reduction measures that are necessary to make reasonable progress. Section 4.2.7 briefly summarizes the MANE-VU photochemical modeling that New Hampshire relied on to support the RPGs. Although not a Regional Haze Rule requirement, Section 4.2.7 also briefly describes a Benefits Mapping and Analysis Program (BenMAP) modeling study to assess the health-related co-benefits of the MANE-VU "Ask" measures. The additional modeling, monitoring and emissions information required by §51.308(f)(2)(iii) are found throughout this SIP in the appropriate sections.

The final step is to decide which control measures are necessary to make reasonable progress and incorporate those controls into the LTS. New Hampshire is committed to implementing the LTS contained in Section 4.2.10 to improve visibility at MANE-VU's seven Class I areas and nearby Federal Class I areas shown in Figure 2-1.

4.2.1 Selection of New Hampshire Sources for Analysis

40 CFR§51.308(f)(2)(i) of the Regional Haze Rule as outlined in Step 3 of EPA's 2019 Guidance document requires states to provide a summary of the state's source selection approach as well as a detailed description of how the state used technical information to select a reasonable set of sources for an analysis of control measures for the second implementation period. Section 2 of this SIP describes in detail the technical evaluation of sources within New Hampshire that affect both New Hampshire's Class I areas and Class I areas within the MANE-VU states. New Hampshire's source selection process started with review of Table 2-2 through 2-6. Using the visibility impact threshold of 1 Mm^{-1} light extinction impact to a Federal Class I area both within and outside New Hampshire, the following New Hampshire facilities (and corresponding units) were identified for further analysis of control measures for the second implementation period:

- Granite Shore Power's Merrimack Station (MK1 and MK2);
- Granite Shore Power's Newington Station (NT1);
- Granite Shore Power's Schiller Station (SR4 and SR6);
- Granite Shore Power's White Lake and Lost Nation locations (WLCT1 and LNCT1); and
- Stored Solar, Tamworth (EU01).

New Hampshire included additional sources whose light extinction impact was below the visibility impact threshold of 1 Mm^{-1} for analysis. These additional facilities (and corresponding units) were included in the analysis based on the facility's applicability to the MANE-VU Intra-RPO "Ask" or because the sources were requested by EPA and the FLM:

- Burgess BioPower (EU01);
- Essential Power (EU01 and EU02);
- Granite Ridge Energy (EU01 and EU02);
- Granite Shore Power's Merrimack Station (MKCT1 and MKCT2);
- Granite Shore Power's Schiller Station (SR5 and SRCT); and
- Wheelabrator Concord (EU01 and EU02).

4.2.2 Sectors that Reasonably Contribute to Visibility Impairment

A state's LTS must include enforceable emission reduction measures necessary to make reasonable progress. A state's LTS should address all types of manmade emissions contributing to visibility degradation in Federal Class I areas, including those from mobile sources; stationary sources (such as power plants and factories); smaller, so-called "area" sources (such as residential wood stoves and small boilers); and prescribed fires, then determine what reduction measures are needed to make reasonable progress.

§51.308(f)(2)(i) of the Regional Haze Rule as outlined in Step 4 of EPA's 2019 Guidance document requires states to evaluate and determine the emission reduction measures that are necessary to make reasonable progress by considering four statutory requirements:

- Costs of compliance;
- Time necessary for compliance;
- Energy and non-air quality environmental impacts of compliance; and
- Remaining useful life of any existing source subject to such requirements.

In 2007, MARAMA sponsored an analysis of the costs of potential measures to improve visibility in Class I areas in and near the Mid-Atlantic and Northeast region for the first planning period (2008 – 2018). The effort resulted in a report prepared for MANE-VU by MACTEC Engineering and Consulting Inc. entitled Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas[40]. The report considered the four statutory requirements listed above to help MANE-VU members determine which emission control measures may be needed to make reasonable progress in improving visibility.

In 2015, MARAMA issued a contract for SRA International, Inc.[41] to conduct appropriate analyses to update the cost information in the following chapters of the 2007 report:

- Chapter 2 - Source Category Analysis: EGUs;
- Chapter 4 - Source Category Analysis: Industrial, Commercial, and Institutional Boilers;
- Chapter 8 - Heating Oil;
- Chapter 9 - Residential Wood Combustion; and
- Chapter 10 - Outdoor Wood Fired Boilers.

In addition, the Chapters regarding EGUs and ICI boilers were expanded to describe NO_X emissions control options and costs. This update was done for use by MANE-VU states for the second planning period.

For the second planning period, MANE-VU found that the top emitters were the same source categories initially selected during the first planning period. Since a four-factor analysis was already performed for these sources in the first planning phase, MANE-VU updated the existing four-factor analysis and used it for the second planning period. This is consistent with EPA's 2019 Guidance document, which states that a state may use a four-factor analysis from the first planning period:

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40 MARAMA, (July 2007). *Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas Final Report*. Available at https://marama.org/library/

41 Sabo E., (January 2016). *2016 Updates to the Assessment of Reasonable Progress for Regional Haze in MANE-VU Class I Areas*. Appendix L.

> "A state may consider in its analysis of control measures how it, other states, and EPA made reasonable progress decisions during the first implementation period and may consider final decisions already made in the second implementation period, if any." (pg.39)

MANE-VU applied the four factors to a series of emission control measures.[42] The MARAMA documents present the updated analyses of the economic and environmental impacts of potential control scenarios that could be implemented by MANE-VU states to reduce emissions from the above source categories in order to make reasonable progress toward meeting visibility improvement goals. Table 4-7 presents a summary of MANE-VU's assessment of pollutants and associated source categories affecting visibility in mandatory Federal Class I areas in and near MANE-VU, lists possible control measures for those pollutants and source categories, and develops the requisite four-factor analysis.

Table 4-7: Summary of the Four-Factor Analysis

Source Category	Primary Regional Haze Pollutant	Control Measure(s)	Average Cost (per ton of pollutant reduction)	Compliance Timeframe	Energy and Non-Air Quality Environmental Impacts	Remaining Useful Life
Electric Generating Units	SO_2	Switch to a low sulfur coal (generally <1% sulfur), switch to natural gas (virtually 0% sulfur), coal cleaning, Flue Gas Desulfurization (FGD)-Wet, -Spray Dry, or -Dry.	$800-$2,300 based on EPA Base Case v5.13 (in 2011$)	2-3 years following SIP submittal	Fuel supply issues, potential permitting issues, reduction in electricity production capacity, wastewater issues	50 years or more
Industrial, Commercial, Institutional Boilers	SO_2	Switch to a low sulfur coal (generally <1% sulfur), switch to natural gas (virtually 0% sulfur), switch to a lower sulfur oil, coal cleaning, combustion control, Flue Gas Desulfurization (FGD)- Wet, -Spray Dry, or -Dry.	$600-$7,700 (in 2014$) based on available literature; dependent on size.	2-5 years following SIP submittal	Fuel supply issues, potential permitting issues, control device energy requirements, wastewater issues	10-30 years
Cement and Lime Kilns	SO_2	Fuel switching, Dry Flue Gas Desulfurization-Spray Dryer Absorption (FGD), Wet Flue Gas Desulfurization (FGD), Advanced Flue Gas Desulfurization (FGD).	$1,900-$73,000 (in 2006$) based on available literature. Depends on size.	2-3 years following SIP submittal	Control device energy requirements, wastewater issues	10-30 years
Heating Oil	SO_2	Lower the sulfur content in the fuel. Depends on the state.	$550-$750 (in 2006$) based on available literature; high degree of uncertainty with this cost estimate.	Currently feasible. Capacity issues may influence timeframe for implementation of new fuel standards	Increases in furnace/boiler efficiency, Decreased furnace/boiler maintenance requirements	18-25 years
Residential Wood Combustion	PM	State implementation of NSPS, ban on resale of uncertified devices, installer training certification or inspection program, pellet stoves, EPA Phase II certified RWC devices, retrofit requirement, accelerated changeover requirement, accelerated changeover inducement.	$30-$246,000 (in 2014$) based on available literature	Several years - dependent on mechanism for emission reduction	Reduce greenhouse gas emissions, increase efficiency of combustion device	10-15 years
Outdoor Wood Boilers	PM	Regulatory approaches to reducing wood smoke, voluntary programs to replace old, inefficient wood stoves and fireplaces, and education and outreach tools to promote cleaner burning	$170-$3070 (in 2014$) according to CSRA	2-22 years, depending on mechanism for emission reductions	Increased logging to satisfy the demand for firewood may cause water quality issues, soil erosion and compaction, and loss of habitat for sensitive species.	20 years

[42] Memo from MANE-VU TSC to MANE-VU Air Directors, (March 2017). *Re: Four-Factor Data Collection* March 30, 2017. Appendix K.

The updated 2015 MARAMA analysis was evaluated by MANE-VU to eliminate those control measures that failed to meet one or more of the statutory factors. During consultation with MANE-VU member states and contributing states, it was agreed that the most reasonable emission reductions at this time can be achieved for EGUs, ICI boilers, reducing energy demand and encouraging clean energy development and use, and a wider adoption of ultra-low sulfur fuel oil. In addition to measures that some MANE-VU states had already determined as being cost-effective in their states, MANE-VU incorporated some of the most promising control measures analyzed by MARAMA into the MANE-VU "Asks" as a minimum starting point for contributing states to evaluate further in their states when in developing their LTS.

4.2.3 Interstate Consultation

New Hampshire consulted with other states as identified in Section 3.2.1 in accordance with 40 CFR §51.308(f)(2)(ii) which says:

> "The State must consult with those States that have emissions that are reasonably anticipated to contribute to visibility impairment in the mandatory Class I Federal area to develop coordinated emission management strategies containing the emission reductions necessary to make reasonable progress."

The consultation process undertaken for the second implementation period is described in detail in Appendix G.

According to the federal Regional Haze Rule (40 CFR §51.308 (f)(2)(i) through (iv)), all states must consider, in their Regional Haze SIPs, the emission reduction measures identified by Class I states as being necessary to make reasonable progress in any Federal Class I area. After reviewing the four-factor analysis, each MANE-VU Class I member state determined reasonable measures to begin consultation with all MANE-VU states (Intra-RPO consultation) and then subsequently, other contributing states (Inter-RPO consultation). These measures (identified as reasonable by the MANE-VU Class I states) were the basis of the MANE-VU "Asks" to be discussed during consultation. The "Ask" was divided into three parts, the "Intra-RPO Ask" for Intra-MANE-VU consultation, the "Inter-RPO Ask" for consultation with non-MANE-VU contributing states, and the "Ask" specific to FLM and EPA. These "Asks" were adopted by MANE-VU Class I States on August 25, 2017, and are included in Appendices N, O and P.

The MANE-VU "Ask" focuses on what MANE-VU Class I states identified as reasonable measures to apply over the Northeast region and contributing states. The states focused on controls for SO_2 and NO_X emissions (which also form particles) as being the most reasonable measures to apply at this time while Federal Class I areas are already ahead of their URP requirements. Additional measures for other emissions sources, including visibility-impairing particulate matter emission sources, could be assessed individually by states, EPA and the FLM.

New Hampshire has included in this implementation plan all measures agreed to during state-to-state consultations, and has considered emission reduction measures identified by other states. No disagreements relative to the nature of the request or the ability to complete it were encountered during the consultation process.

4.2.4 The MANE-VU Intra-RPO "Ask"[43]

The "Intra-RPO Ask" is intended for the MANE-VU states and tribes that contribute to MANE-VU's Class I Areas and should be addressed in their regional haze SIP updates. Portions of the "Intra-RPO Ask" are shown below:

> "To address the impact on mandatory Class I Federal areas within the MANE-VU region, the Mid-Atlantic and Northeast States will pursue a coordinated course of action designed to assure reasonable progress toward preventing any future, and remedying any existing impairment of visibility in mandatory Class I Federal areas and to leverage the multi-pollutant benefits that such measures may provide for the protection of public health and the environment. Per the Regional Haze Rule, being on or below the URP for a given Class I area is not a factor in deciding if a State needs to undertake reasonable measures." (pg. 2)
>
> "In addressing the emission reduction strategies in the "Ask," the MANE-VU states will need to harmonize any activity on the strategies in the "Ask" with other federal or state requirements that affect the sources and pollutants covered by the "Ask." These federal and state requirements include, but are not limited to:
>
> - The 2010 SO_2 standard,
> - The Regional Greenhouse Gas Initiative (RGGI), if applicable,
> - The Mercury and Air Toxics Standards (MATS), and
> - The new 2015 ozone standard.
>
> Because of this need for cross-program harmonization and because of the formal public process required by the federal CAA and state rulemaking processes, it is expected that there will be opportunities for stakeholders and the public to comment on how states intend to address the measures in the "Ask."" (pg. 1-2)
>
> "Therefore, the course of action for pursuing the adoption and implementation of measures necessary to meet the 2028 RPG for regional haze include the following "emission management" strategies:
>
> 1. *EGUs with a nameplate capacity larger than or equal to 25MW with already installed NO_X and/or SO_2 controls - ensure the most effective use of control technologies on a year-round basis to consistently minimize emissions of haze precursors[44], or obtain equivalent alternative emission reductions;*
> 2. *Emission sources modeled by MANE-VU that have the potential for 3.0 Mm^{-1} or greater visibility impacts at any MANE-VU Class I area, as identified by MANE-VU contribution analyses [see Table 4-8] - perform a four-factor analysis for reasonable installation or upgrade to emission controls;"*(pg. 2)

The MANE-VU states set a visibility-impairment threshold of 3 Mm^{-1} at any MANE-VU Class I area to differentiate the largest sources potentially affecting visibility at any MANE-VU Class I area, including

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[43] MANE-VU, (August 2017). *Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) States Concerning a Course of Action within MANE-VU Toward Assuring Reasonable Progress for the Second Regional Haze Implementation Period (2018-2028)*. Appendix N.

[44] MANE-VU TSC (November 2017). *Impact of Wintertime SCR/SNCR Optimization on Visibility Impairing Nitrate Precursor Emissions.* Appendix Q.

New Hampshire's. By requesting a four-factor analysis of these sources, a planned shutdown, or other factors, may be considered when determining what installation or upgrade of controls would be reasonable.

NHDES and the MANE-VU states chose the extinction threshold of 3 Mm^{-1} after considering progress being made in the Class I areas (see Section 1.4 of the SIP) and expected emissions reductions due to existing programs, the conclusions of the four-factor analysis from the first implementation period as updated for the second implementation period, and the level of reductions represented by a range of thresholds examined. MANE-VU considered 1, 2, 3 and 10 Mm^{-1} thresholds and the number of sources that would need to be examined. The 3 Mm^{-1} threshold would encompass approximately the top 7 to 26 units affecting each Class 1 area and approximately 40% of the haze forming emissions from all large stationary sources. The lower thresholds of 1 and 2 Mm^{-1} would roughly triple and double the number of units that would have to be analyzed, respectively, with diminishing potential visibility benefit per unit analyzed.

Table 4-8: Emission Units Exceeding 3.0 Mm^{-1} Visibility Impacts at any MANE-VU Class I Area

State	Facility Name	Facility/ ORIS ID	Unit IDs	MANE-VU Class I Maximum Extinction (dv)
MA	Brayton Point	1619	4	4.3
MA	Canal Station	1599	1	3.0
MD	Herbert A Wagner	1554	3	3.8
MD	Luke Paper Company	7763811	001-0011-3-0018	6.0
MD	Luke Paper Company	7763811	001-0011-3-0019	5.9
ME	The Jackson Laboratory	7945211	7945211	10.2
ME	William F Wyman	1507	4	5.6
ME	Woodland Pulp LLC	5974211		7.5
NH	Merrimack	2364	2	3.3
NJ	B L England	2378	2,3	5.6
NY	Finch Paper LLC	8325211	12	5.9
NY	Lafarge Building Materials Inc	8105211	43101	8.1
PA	Brunner Island	3140	1,2	4.0
PA	Brunner Island	3140	3	3.8
PA	Homer City	3122	1	9.3
PA	Homer City	3122	2	8.1
PA	Homer City	3122	3	3.3
PA	Keystone	3136	1	3.2
PA	Keystone	3136	2	3.1
PA	Montour	3149	1	4.4
PA	Montour	3149	2	4.1
PA	Shawville	3131	3,4	3.6

Additional elements of the "Intra-RPO Ask" include:

"3. Each MANE-VU State that has not yet fully adopted an ultra-low sulfur fuel oil standard as requested by MANE-VU in 2007 - pursue this standard as expeditiously as possible and before 2028, depending on supply availability, where the standards are as follows:

a. distillate oil to 0.0015% sulfur by weight (15 ppm),
b. #4 residual oil within a range of 0.25 to 0.5% sulfur by weight,
c. #6 residual oil within a range of 0.3 to 0.5% sulfur by weight.

4. EGUs and other large point emission sources greater than 250 MMBtu per hour heat input that have switched operations to lower emitting fuels – pursue updating permits, enforceable agreements, and/or rules to lock-in lower emission rates for SO_2, NO_X and particulate matter. The permit, enforcement agreement, and/or rule can allow for suspension of the lower emission rate during natural gas curtailment;

5. Where emission rules have not been adopted, control NO_X emissions for peaking combustion turbines that have the potential to operate on high electric demand[45] days by:

a. Striving to meet NO_X emissions standard of no greater than 25 ppm at 15% O_2 for natural gas and 42 ppm at 15% O_2 for fuel oil but at a minimum meet NO_X emissions standard of no greater than 42 ppm at 15% O_2 for natural gas and 96 ppm at 15% O_2 for fuel oil[46], or
b. Performing a four-factor analysis for reasonable installation or upgrade to emission controls, or
c. Obtaining equivalent alternative emission reductions on high electric demand days."(pg. 3)

"Ask #5" is only directed to the MANE-VU states and is not included in the "Ask" directed to upwind, potentially contributing states. It targets relatively small EGUs that operate during a small proportion of the year on high electric demand days, but that tend to have higher emission rates per unit of energy produced. Targeting these units is considered reasonable due to MANE-VU analyses that show correlation between high electric demand days and the 20% most impaired days. The values included in the "Ask" are consistent with values used by MANE-VU states that have already tightened emission requirements of such units. While this reasonable measure was developed to assist in achieving the ozone NAAQS, it also has added benefits to reducing visibility impairing pollutants as well and should be considered a reasonable measure for regional haze reduction as well.

Finally, the "Intra-RPO Ask" includes:

"6. Each State should consider and report in their SIP measures or programs to: a) decrease energy demand through the use of energy efficiency, and b) increase the use within their state of Combined Heat and Power[47] (CHP) and other clean Distributed Generation technologies including fuel cells, wind, and solar."(pg. 4)

45 MANE-VU, (December 2017). *High Electric Demand Days and Visibility Impairment in MANE-VU*. Appendix R.
46 This emission level was determined by MANE-VU to be a reasonable threshold based on emission requirements already developed by member states.
47 MANE-VU TSC, (March 2016). *Benefits of Combined Heat and Power Systems for Reducing Pollutant Emissions in MANE-VU States*. Appendix S.

4.2.5 The MANE-VU Inter-RPO "Ask"[48]

The following states outside of MANE-VU were identified by MANE-VU as contributing to visibility impairment at MANE-VU Class I areas: Alabama, Florida, Illinois, Indiana, Kentucky, Louisiana, Michigan, Missouri, North Carolina, Ohio, Tennessee, Texas, Virginia and West Virginia. Therefore, these states should address this "Ask" in their regional haze SIP updates in addition to any other Federal Class I area state "Ask". For New Hampshire specific Class I areas (Great Gulf Wilderness and Presidential Range - Dry River Wilderness), these states include Kentucky, Illinois, Indiana, Louisiana, Michigan, Missouri, North Carolina, Ohio, Texas, Virginia and West Virginia. Contributing state methodology is documented in Section 3.2.1 and the MANE-VU report Appendix E, *Selection of States for MANE-VU Regional Haze Consultation (2018)*, using actual 2015 emissions for EGUs and 2011 for other emission sources. The selection process was described in Section 4.2.

The text of the "Inter-RPO Ask" is as follows:

> "In addressing the emission reduction strategies in the "Ask," states will need to harmonize any activity on the strategies in the "Ask" with other federal or state requirements that affect the sources and pollutants covered by the "Ask." These federal and state requirements include, but are not limited to:
>
> - The 2010 SO_2 standard,
> - The Regional Greenhouse Gas Initiative (RGGI), if applicable,
> - The Mercury and Air Toxics Standards (MATS), and
> - The new 2015 ozone standard.
>
> Because of the need for cross-program harmonization and because of the formal public process required by the federal CAA and state rulemaking processes, it is expected that there will be opportunities for stakeholders and the public to comment on how states intend to address the measures in the "Ask." To address the impact on mandatory Federal Class I areas within the MANE-VU region, the Mid-Atlantic and Northeast States will pursue a coordinated course of action designed to assure reasonable progress toward preventing any future, and remedying any existing impairment of visibility in mandatory Federal Class I areas and to leverage the multi-pollutant benefits that such measures may provide for the protection of public health and the environment.
>
> Therefore, the course of action for pursuing the adoption and implementation of measures necessary to meet the 2028 RPG for regional haze include the following "emission management" strategies:
>
> 1. *EGUs with a nameplate capacity larger than or equal to 25MW with already installed NO_X and/or SO_2 controls - ensure the most effective use of control technologies on a year-round basis to consistently minimize emissions of haze precursors, or obtain equivalent alternative emission reductions;*

[48] MANE-VU, (August 2017). *Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) States Concerning a Course of Action in Contributing States Located Upwind of MANE-VU Toward Assuring Reasonable Progress for the Second Regional Haze Implementation Period (2018-2028)*. Appendix O.

2. *Emission sources modeled by MANE-VU that have the potential for 3.0 Mm^{-1} or greater visibility impacts at any MANE-VU Class I area, as identified by MANE-VU contribution analyses [see Table 4-9] – perform a four-factor analysis for reasonable installation or upgrade to emission controls;”* (pgs. 2-3)

Table 4-9: 14 EGUs Located Outside the MANE-VU Region with MANE-VU Screening Modeling Exceeding 3.0 Mm^{-1} at a MANE-VU Class I Area

State	Facility Name	Facility/ ORIS ID	Unit IDs	MANE-VU Class 1 Maximum Extinction (dv)
IN	Rockport	6166	MB1, MB2	3.8
KY	Big Sandy	1353	BSU1, BSU2	3.5
MI	Belle River		2	4.0
MI	Belle River		1	3.7
MI	St. Clair	1743	1,2,3,4,5,6	3.1
OH	Avon Lake Power Plant	2836	12	9.2
OH	Gen J M Gavin	8102	1	3.3
OH	Gen J M Gavin	8102	2	3.1
OH	Muskingum River	2872	5	7.7
OH	Muskingum River	2872	1,2,3,4	4.4
VA	Yorktown Power Station	3809	3	10.9
VA	Yorktown Power Station	3809	1,2	7.0
WV	Harrison Power Station		1 (25%), 2 (20%)	7.0
WV	Kammer	3947	1,2,3	3.2

“3. States should pursue an ultra-low sulfur fuel oil standard similar to the one adopted by the MANE-VU States in 2007 as expeditiously as possible and before 2028, depending on supply availability, where the standards are as follows:

a. distillate oil to 0.0015% sulfur by weight (15 ppm),
b. #4 residual oil within a range of 0.25 to 0.5% sulfur by weight,
c. #6 residual oil within a range of 0.3 to 0.5% sulfur by weight.

4. EGUs and other large point emission sources greater than 250 MMBtu per hour heat input that have switched operations to lower emitting fuels – pursue updating permits, enforceable agreements, and/or rules to lock-in lower emission rates for SO_2, NO_X and particulate matter. The permit, enforcement agreement, and/or rule can allow for suspension of the lower emission rate during natural gas curtailment;

5. Each State should consider and report in their SIP measures or programs to: a) decrease energy demand through the use of energy efficiency, and b) increase the use within their state of Combined Heat and Power (CHP) [49] *and other clean Distributed Generation technologies including fuel cells, wind, and solar.”* (pg. 3)

49 MANE-VU TSC, (March 2016). *Benefits of Combined Heat and Power Systems for Reducing Pollutant Emissions in MANE-VU States*. Appendix S.

4.2.6 The MANE-VU EPA and FLM "Ask" [50]

The transport range of visibility impairing pollutants has been demonstrated to be extensive and well beyond the MANE-VU region. For example, a wildfire near Fort McMurray, Alberta, in western Canada in 2016 brought visibility impairing fine particulate matter and ozone over 2,000 miles into the region at concentrations that contributed to exceedances of the health standard in some locations. Clearly, states located beyond those that MANE-VU chose to consult for regional haze can play an active role in impairing visibility at the MANE-VU Class I areas. Further, despite the fact that on-road vehicles produce a significant portion of the visibility impairing pollutants that affect our Class I areas, they are beyond New Hampshire's ability to regulate. Therefore, the MANE-VU Class I area states need additional help from the EPA and FLMs in pursuing important reasonable emission control measures. These include, but are not limited to, the following contained in the 2017 MANE-VU letter regarding actions requested that EPA and the FLM take to help MANE-VU further improve visibility in our Class I areas:

"1. FLMs to consult with MANE-VU Class I area states when scheduling prescribed burns and ensure that these burns do not impact nearby IMPROVE visibility measurements and do not impact potential 20 percent most and least visibility impaired days;

2. EPA to develop measures that will further reduce emissions from heavy-duty on-road vehicles; and

3. EPA to ensure that Class I Area state "Asks" are addressed in "contributing"' state SIPs prior to approval. In the case of this "Ask," contributing states are defined as those that the MANE-VU Class I area states requested for consultation." (pg. 2)

4.2.7 Technical Basis for the MANE-VU "Ask"

The MANE-VU TSC in conjunction with the OTC Modeling Committee, performed photochemical modeling in support of MANE-VU's Regional Haze objectives and to fulfill the technical basis requirement of 40 CFR §51.308(f)(2)(iii). Modeling to determine the RPGs for the New Hampshire Class I areas included measures documented in the "Asks" and documented in the modeling Technical Support Document.[51] Modeled RPGs are shown in Figure 4-2 earlier in this document.

In addition to modeling 2028 visibility improvement resulting from implementation of the "Asks," MANE-VU evaluated health implications with the BenMAP model. BenMAP is the model used by EPA to evaluate heath changes resulting from proposed changes in rules and revisions to health standards. MANE-VU found that emissions changes not only resulted in lower fine particulate matter ($PM_{2.5}$) and ozone concentrations but also improved public health and a lower mortality rate in contributing states as well as MANE-VU states with Class I areas.

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[50] MANE-VU, (August 2017). *Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) States Concerning a Course of Action by the Environmental Protection Agency and Federal Land Managers Toward Assuring Reasonable Progress for the Second Regional Haze Implementation Period (2018-2028)*. Appendix P.

[51] OTC/MANE-VU, (October 2018). O*zone Transport Commission/Mid-Atlantic Northeastern Visibility Union 2011 Based Modeling Platform Support Document – October 2018 Update*. Appendix U.

4.2.8 Additional Factors Considered in Developing the LTS

In accordance with 40 CFR §51.308(f)(2)(iv), New Hampshire considered the following additional factors:

Emission reductions due to ongoing air pollution control programs, including measures to address reasonably attributable visibility impairment.

- New Hampshire's Code of Administrative Rules Env-A 1300, *Nitrogen Oxides (NO_X) Reasonably Available Control Technology (RACT)* was revised in 2018 as part of New Hampshire's SIP for the 2008 and 2015 8-hour ozone standards. The changes to Env-A 1300 include the following:
    - Streamlined the annual performance tune-up on applicable boiler(s) to match federal requirements in 40 CFR 63, Subpart JJJJJJ and Subpart DDDDD.
    - Lowered the NO_X emission standards for municipal waste combustors.
    - Lowered the NO_X emission standards for older load shaving, gas-fired engines to match older prime power, gas-fired engine limits.
    - Lowered the NO_X emission standards for older load shaving and older prime power, liquid-fired engines to 40 CFR 60, Subpart IIII Tier 2 levels.
    - Lowered the NO_X emissions standards for cyclone-firing, wet-bottom utility boilers firing coal.

  The amended Env-A 1300 rule was submitted to the EPA as a SIP revision on September 6, 2018.

- The State's largest EGU (Granite Shore Power – Merrimack Station) installed a wet, limestone-based FGD system in order to comply with state law RSA 125-O, *Multiple Pollutant Reduction Program*, which required the reduction of mercury emissions by at least 80% from New Hampshire's fossil-fuel-fired power plants. The removal of SO_2 at Merrimack Station occurs as a co-benefit of the common FGD system installed on Units MK1 and MK2. Operation of the FGD system also fulfills this facility's requirements for BART under EPA's Regional Haze Rule [64 FR 35714]. BART emission limits are specified in New Hampshire's Code of Administrative Rules Env-A 2300, *Mitigation of Regional Haze*. EPA approved the rule effective November 14, 2016 [81 FR 70361]. Env-A 2300 requires SO_2 emission limitations to be established for MK1 and MK2 in a permit. Therefore, the SO_2 emission limitations and FGD SO_2 control efficiency requirements were established in a federally-enforceable permit (TV-0055) issued to Merrimack Station on September 1, 2016.

  Discussion of the SIP-approved BART emission limits in Env-A 2300 and further NO_X RACT reductions required of sources in New Hampshire is covered in Section 4.2.9 below.

- The ultra-low sulfur fuel oil portion of the 2017 MANE-VU "Ask" has been fulfilled. New Hampshire has amended state law RSA 125-C:10-d, *Sulfur Limits of Certain Liquid Fuels*. Beginning on July 1, 2018, fuel imported into New Hampshire is required to meet the following reduced sulfur limits – 0.0015% for No. 2 fuel oil, 0.25% for No. 4 fuel oil and 0.5% for Nos. 5 or 6 fuel oil. Beginning on February 1, 2019, non-compliant fuels are not allowed to be distributed for sale within the State. This law will result in further reductions in SO_2 emissions from industrial, area, and non-road sources beyond the 30% reduction seen in the 2008 vs. 2014 NEI data. The law was incorporated into New Hampshire's Code of Administrative Rules Env-A 1600, *Fuel Specifications* and was submitted to the EPA as a SIP revision on May 17, 2019. EPA approved the SIP revision on April 26, 2021 [86 FR 21942].

Measures to mitigate the impacts of construction activities.

The construction industry is already subject to requirements for controlling pollutants that contribute to visibility impairment. For example, federal regulations require the reduction of SO_2 emissions from construction vehicles.

- At the state level, New Hampshire's Code of Administrative Rules Env-A 1000, *Prevention, Abatement, and Control of Open Source Air Pollution*, requires the control of direct emissions of particulate matter (primarily crustal material) from mining, transportation, storage, use, and removal activities. These requirements apply to such sources as quarries, unpaved roads, cement plants, construction sites, rock-crushing operations, and general earth-moving activities. Controls may include wet suppression, covering, vacuuming, and other approved means. EPA originally approved the rule effective March 19, 2018 [83 FR 6972]. NHDES revised Env-A 1000 in 2019 and the amended Env-A 1000 rule was submitted to the EPA as a SIP revision on August 19, 2021.
- New Hampshire's Code of Administrative Rules Env-A 2800, *Sand and Gravel Sources: Non-Metallic Mineral Processing Plants; Cement and Concrete Sources*, requires the control of fugitive dust and standards for particulate matter emissions and visible emissions from sand and gravel sources, non-metallic mineral processing plants, and cement and concrete sources. EPA approved the rule effective December 7, 2016 [81 FR 78052]. NHDES revised Env-A 2800 in 2018 and the amended Env-A 2800 rule was submitted to the EPA as a SIP revision on January 8, 2020.

Source retirement and replacement schedules.

The most impactful of New Hampshire's sources are the fossil-fuel-fired EGUs. While recent developments in the oil and gas industry have forced rapid changes in the power production sector, and some generating units have experienced sharp reductions in utilization, no retirements or replacements of New Hampshire's EGUs have occurred or been announced since the regional haze SIP was first submitted in 2010. While Granite Shore Power announced an extended outage at Schiller Station in June of 2020 with no end date, no official word from the company regarding a permanent shut down has been announced by the owners.

Basic smoke management practices for prescribed fires.

Prescribed burns may have short-term visibility impacts. Such impacts are addressed by the New Hampshire Prescribed Fire Council in its recommended standards[52] for planning and implementing prescribed burns. The U.S. Forest Service and NHDES are members of the council and assisted in the development of these standards. Chapter 10 of the standards, which covers smoke management and air quality, recommends as follows: "The burn plan will screen for all smoke sensitive features within one and five miles of the planned burn, and identify measures for minimizing negative impacts of smoke to these features." Federal Class I areas are not specifically identified as smoke sensitive features. However, both of New Hampshire's Class I areas are within the WMNF; thus, the FLM (in this case, the U.S. Forest Service) would be informed of any planned burn in nearby lands. For any prescribed fire within the WMNF, the burn plan would have to meet the FLM's own requirements for protection of Federal Class I

52 NH Prescribed Fire Council, (March 2019). *Planning for Prescribed Burning in New Hampshire – Minimum Recommended Standards for Planning & Implementing Prescribed Burns.* Available at https://extension.unh.edu/resources/files/Resource001886_Rep2781.pdf.

areas, which are more stringent than the New Hampshire Prescribed Fire Council's standards.

The anticipated net effect on visibility due to projected changes in point, area, and mobile source emissions. See Section 5.4.

4.2.9 Emission Reduction Measures Necessary for Reasonable Progress for New Hampshire

This section summarizes the evaluation of New Hampshire sources and determination of emission reduction measures necessary to make reasonable progress for regional haze. New Hampshire evaluated the current regulatory requirements, enforceable emission limitations contained in permits and RACT Orders and existing control equipment in place at the sources identified in Section 4.2.1. NHDES requested additional information including a four factor analysis from Granite Shore Power for both the Merrimack Station EGUs and all combustion turbines operated by Granite Shore Power in New Hampshire. Findings of this evaluation and subsequent changes to rules and permits are discussed in detail below. A copy of all applicable permits referenced below can be found in Appendix V. The MANE-VU "Ask" as it applies to New Hampshire seeks full implementation by 2028. However, all of these measures listed below are already in effect, and New Hampshire considers them necessary to make reasonable progress.

1. *EGUs ≥ 25MW with already installed NO_X and/or SO_2 controls - ensure the most effective use of control technologies on a year-round basis or obtain equivalent alternative emission reductions.*

   Twelve EGUs at seven stationary sources in New Hampshire were identified as meeting the criteria of "Ask #1" (i.e. capacity ≥ 25MW with already installed NO_X and/or SO_2 controls). These include:

Table 4-10: New Hampshire Electric Generating Units Subject to MANE-VU "Ask #1"

Facility	Emission Unit	Capacity (MW)	Existing NO_X Controls	Existing SO_2 Controls
Burgess BioPower	EU01	75	SCR	Inherently low sulfur fuels: Biomass – clean wood chips No. 2 fuel oil for startup only (0.0015 wt% sulfur)
Essential Power Newington	EU01 EU02	525	DLN and SCR	Inherently low sulfur fuels: Natural Gas No. 2 fuel oil (0.0015 wt% sulfur)
Granite Ridge Energy	EU01 EU02	720	DLN and SCR	Inherently low sulfur fuel: Natural Gas
Stored Solar Tamworth	EU01	25	OFA, FGR, SNCR and SCR	Inherently low sulfur fuel: Biomass – clean wood chips
Granite Shore Power (GSP) Merrimack Station	MK1 MK2	459	SCR	FGD

Facility	Emission Unit	Capacity (MW)	Existing NO_X Controls	Existing SO_2 Controls
Granite Shore Power (GSP) Schiller Station	SR4	150	LNB, OFA and SNCR	DSI
	SR5		SNCR	Inherently low sulfur fuel (when combusting biomass – clean wood chips) or Limestone Injection (required when combusting coal)
	SR6		LNB, OFA and SNCR	DSI
Granite Shore Power (GSP) Newington Station	NT1	400	LNB, OFA and water injection	N/A

- **Burgess BioPower**: Burgess BioPower's operation is covered by Title V Operating Permit TV-0065 issued on December 24, 2020, which limits NO_X emissions from the biomass boiler to 0.060 lbs/MMBtu on a 30-day rolling average, based on the use of Selective Catalytic Reduction (SCR) technology and SO_2 emissions to 0.012 lbs/MMBtu. The biomass unit at this facility was subject to Nonattainment New Source Review (NNSR) for NO_X at the time of the facility's initial permitting; hence, the NO_X limit represents Lowest Available Emission Rate (LAER).[53] Burgess BioPower uses clean wood in the boiler during normal operations and ultra-low sulfur fuel oil during boiler startups. Both fuels are inherently very low in sulfur. The Burgess BioPower facility was also subject to Prevention of Significant Deterioration (PSD) review for SO_2 at the time of its initial permitting in 2010; hence, the SO_2 limit was established as a Best Available Control Technology (BACT) based limit.[54] Sorbent injection was installed for acid gas control but is not used to control SO_2 emissions because the emissions from burning wood are inherently very low (typically around 0.001 lbs SO_2/MMBtu). Low-sulfur fuels, SCR operation and the NO_X and SO_2 emission limitations are required by TV-0065 on a year-round basis. Continuous emissions monitoring data at the facility has shown that operation of the sorbent injection is not necessary to comply with the emission limit for SO_2. Supplemental CALPUFF modeling performed by NHDES showed 0.07 Mm^{-1} impact at Acadia, 0.83 Mm^{-1} impact at Great Gulf and 0.68 Mm^{-1} impact at Presidential Range/Dry River.

  NHDES has determined that no further limitations as a result of MANE-VU "Ask #1" are required of this source. The federally enforceable limits are contained in Title V Operating Permit TV-0065 (Appendix V).

53 A February 2021 review of the EPA RBLC for biomass fired boilers greater than or equal to 250 MMBtu/hr indicates that 0.060 lb/MMBtu remains as LAER for NOx. While two recent determinations for similar facilities in Vermont established emission rates as low as 0.030 lb/MMBtu on a 12-month rolling period, NHDES understands that these rates have yet to be confirmed. The associated short-term limits for these two VT facilities are 0.060 lb/MMBtu.

54 A June 2018 review of the EPA RBLC for biomass fired EGUs greater than or equal to 25 MW indicates that low sulfur fuels remains the SO_2 BACT.

- **Essential Power Newington**: Essential Power Newington's operation is covered by Title V Operating Permit TV-0058 which limits NO_X and SO_2 emissions to those listed in Table 4-11.

Table 4-11: Essential Power Newington Permitted Emissions and Control Technologies

Pollutant	Fuel	Limitation	Technology BACT/LAER	Averaging Time
NO_X	Natural Gas	2.5 ppmvd @ 15% O_2	Dry Low NO_X Burner with SCR (LAER/BACT)	3 hour block average
NO_X	No. 2 fuel oil (0.0015 wt% sulfur)	9.0 ppmvd @ 15% O_2	Dry Low NO_X Burner with Water Injection and SCR (LAER/BACT)	1 hour block average
SO_2	Natural Gas	0.0071 lbs/MMBtu	Low Sulfur Fuels (BACT)	3 hour rolling
SO_2	No. 2 fuel oil (0.0015 wt% sulfur)	0.0015 lbs/MMBtu	Low Sulfur Fuels (BACT)	3 hour rolling

The units at this facility were subject to NNSR for NO_X at the time of their initial permitting in July 2010; hence, these NO_X limits were established as LAER [55] based limits. The Newington units use dry low NO_X (DLN) combustion combined with SCR (as well as water injection during limited firing on ultra-low sulfur fuel oil). The facility is required by permit to use inherently low sulfur fuels (natural gas and ultra-low sulfur fuel oil). The units at this facility were subject to PSD review for SO_2 at the time of their initial permitting; hence, these SO_2 limits were established BACT-based limits.[56] Low-sulfur fuels, DLN/SCR operations and the NO_X and SO_2 emission limitations are required by TV-0058 on a year-round basis. Supplemental CALPUFF modeling performed by NHDES showed 0.29 Mm^{-1} impact at Acadia, 0.24 Mm^{-1} impact at Great Gulf and 0.30 Mm^{-1} impact at Presidential Range/Dry River.

NHDES has determined that no further limitations as a result of MANE-VU "Ask #1" are required of this source. The federally enforceable limits are contained in Title V Operating Permit TV-0058 (Appendix V).

- **Granite Ridge Energy:** Granite Ridge Energy's operation is covered by Title V Operating Permit TV-0056 which limits NO_X and SO_2 emissions to those listed in Table 4-12.

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55 A June 2018 review of the EPA RBLC for combined cycle gas turbines greater than 25 MW indicates that this remains the control technology upon which current BACT/LAER levels are based. A review of the RBLC also revealed that the emissions limits currently applicable to these two facilities remain in line with recent BACT/LAER determination (2.5 vs. 2.0 ppmvd @15% O_2). For this reason, NHDES has determined that the current limits at Essential Power Newington and Granite Ridge Energy represent the "most effective use of control technologies" for NOx.

56 A June 2018 review of the RBLC for combined cycle turbines greater than 25 MW indicates that low sulfur fuels remain as SO_2 BACT.

Table 4-12: Granite Ridge Energy Permitted Emissions and Control Technologies

Pollutant	Fuel	Limitation	Technology BACT/LAER	Averaging Time
NO_X	Natural Gas	2.5 ppmvd @ 15% O_2	Low NO_X Burner with SCR (LAER/BACT)	3 hour block average
SO_2	Natural Gas	0.0023 lbs/MMBtu	Low Sulfur Fuel (BACT)	3 hour rolling

The units at this facility were subject to NNSR for NO_X at the time of their initial permitting; hence, these limits were established as LAER[63] based limits. The facility uses inherently low sulfur fuel (natural gas). The units at this facility were subject to PSD review for SO_2 at the time of their initial permitting; hence, this limit was established as a BACT-based limit.[57] Low-sulfur fuel, DLN/SCR operations and the NO_X and SO_2 emission limitations are required by TV-0056 on a year-round basis. Supplemental CALPUFF modeling performed by NHDES showed 0.07 Mm^{-1} impact at Acadia, 0.05 Mm^{-1} impact at Great Gulf and 0.07 Mm^{-1} impact at Presidential Range/Dry River.

NHDES has determined that no further limitations as a result of MANE-VU "Ask #1" are required of this source. The federally enforceable limits are contained in Title V Operating Permit TV-0056 (Appendix V).

- **Stored Solar Tamworth**: Stored Solar Tamworth's operation is covered by Title V Operating Permit TV-0018 which currently limits NO_X emissions to 0.265 lbs/MMBtu over any consecutive 24-hour period. This is a PSD-based limit that was established when the facility was initially permitted in 1987. In 2008, this facility installed overfire air (OFA) and flue gas recirculation (FGR) technologies, as well as a Selective Noncatalytic Reduction (SNCR) system and a SCR system. Since the controls were installed, Stored Solar Tamworth has voluntarily chosen to maintain NO_X emissions at or below 0.075 lb/MMBtu, on a quarterly average for the purpose of generating renewable energy certificates.

  With regard to SO_2, the unit at this facility performed stack testing in 2009, as it was believed that the EPA AP-42 emission factor for biomass combustion was significantly higher than observed in practice. Based on the results of this test (and confirmed by tests at other similar facilities), potential SO_2 emissions are determined to be less than 1 ton per year. Stored Solar uses clean wood for fuel, which is inherently very low in sulfur. Low-sulfur fuels are required by TV-0018 on a year-round basis.

  In response to the MANE-VU "Ask," Stored Solar Tamworth has agreed to take year-round, enforceable NO_X emission limitations as outlined in Table 4-13. NHDES has revised New Hampshire's Code of Administrative Rules Env-A 2300, *Mitigation of Regional Haze* to include these limits and plans to submit the rule to EPA concurrently with this SIP revision. The NO_X emission limitations specified in Table 4-13 below and incorporated into Env-A 2300, will also be included in the facility's Title V Operating Permit. Supplemental CALPUFF modeling performed by NHDES showed that with the reduction in allowable NO_X emissions from 0.265 lb/MMBtu to

57 A June 2018 review of the RBLC for combined cycle turbines greater than 25 MW indicates that low sulfur fuels remain as SO_2 BACT.

0.075 lb/MMBtu, the resulting impact on certain Class I areas was 0.016 Mm^{-1} at Acadia, 0.47 Mm^{-1} at Great Gulf and 0.75 Mm^{-1} at Presidential Range/Dry River.

Table 4-13: Stored Solar Tamworth Proposed NOx Emission Limitations

Pollutant	Limitation	Technology	Averaging Time
NO_X	0.085 lb/MMBtu	Low NO_X Burner and FGR with SNCR/SCR	24-hr calendar day average
NO_X	0.075 lb/MMBtu	Low NO_X Burner and FGR with SNCR/SCR	30 day rolling average
SO_2	N/A	Inherently low sulfur fuel	At all times

- **Granite Shore Power (GSP) Merrimack Station**: GSP Merrimack Station's operation is covered by Title V Operating Permit TV-0055 which limits NO_X and SO_2 emissions to those listed in Table 4-14. MK1 and MK2 are cyclone-firing, wet-bottom utility boilers that burn bituminous coal and are each equipped with SCR for NO_X control as well as two electrostatic precipitators (ESPs) in series for particulate matter control. In addition, as a result of state law *RSA 125-O, Multiple Pollutant Reduction Program*, MK1 and MK2 are equipped with a FGD system which, while designed to reduce mercury emissions, has the co-benefit of removal of SO_2.

Table 4-14: GSP Merrimack Station Permitted Emissions and Control Technologies

Emission Unit	Pollutant	Limitation	Technology	Averaging Time
MK1	NO_X	0.22 lb/MMBtu or	SCR	24-hr calendar day average
		4.0 tons/day		On any calendar day during which a startup or shutdown occurs
MK2	NO_X	0.22 lb/MMBtu or	SCR	24-hr calendar day average
		11.5 tons/day		On any calendar day during which a startup or shutdown occurs
MK2	NO_X[58]	0.86 lb/MMBtu	SCR	Annual average
MK1 & MK2	SO_2[59]	0.39 lb/MMBtu (MK1 & MK2 combined)	FGD	7-boiler operating day rolling average
MK1 & MK2	SO_2[60]	94.0% reduction of uncontrolled SO_2 emissions (MK1 & MK2 combined)	FGD	30-boiler operating day rolling average basis or

58 This NOx emission limit is required under the Federal Acid Rain NOx Emission Reduction Program 40 CFR 76.6(a)(2).
59 This SO_2 emission limitation was established as New Hampshire's primary control strategy for the 2010 1-hour SO_2 Nonattainment SIP.
60 These SO_2 emission limitations and FGD SO_2 control efficiency requirements were established for the purpose of BART and is required under Env-A 2300, *Mitigation of Regional Haze*.

Emission Unit	Pollutant	Limitation	Technology	Averaging Time
MK1 & MK2	SO_2[60]	0.24 lb/MMBtu and 93.4% reduction of uncontrolled SO_2 emissions (MK1 & MK2 combined)	FGD	30-boiler operating day rolling average basis[61]

On May 3, 2018, NHDES requested information from GSP regarding NO_X RACT and Regional Haze Rule requirements associated with the MANE-VU "Ask". For "Ask #1", the request for information was focused on the most effective use of existing control technologies for MK1 and MK2. In addition, GSP completed a four-factor analysis for NO_X and SO_2 for MK1 and MK2 (Appendix T). The four-factor analysis for NO_X included review of fuel switching, OFA, SNCR, reburn, and upgrades to the existing SCR, however all options were deemed technically infeasible to improve NO_X emissions. Also, the analysis for SO_2 controls considered upgrades to the existing FGD, coal cleaning, dry FGD, FGD plus dry sorbent injection (DSI) and fuel switching. There were no alternatives to reduce SO_2 emissions that were technically feasible. Therefore, the four-factor analysis validates the continued use of current enforceable measures for both SO_2 and NO_X.

MK1 and MK2 are subject to New Hampshire's Code of Administrative Rules Env-A 1300, *NO_X RACT*. Env-A 1300 was revised in 2018 as part of New Hampshire's SIP for the 2008 and 2015 8-hr ozone standards. In establishing the NO_X RACT emission limits in the amended NO_X RACT rule, NHDES reviewed historical NO_X emission rates of MK1 and MK2 from EPA's CAMD, consulted with EPA on proposed limits and took into consideration the unique boiler and equipment design and current dispatch of MK1 and MK2.

Historically, MK1 and MK2 were operated as base-loaded units. However, over the past few years, the units have operated significantly less on an annual basis and at a higher ratio of startup/shutdown hours to steady state/full load hours. When the units are in startup, shutdown or low load operation, the SCR permissives (i.e., the parameters necessary for the SCR to operate, e.g., flue gas temperature at the SCR inlet) are not met. The percentage of time the permissives have not been met has increased from 1-2% in 2007 to 17-27% in 2017. This operational change and the corresponding effect on SCR operation is the basis of the daily mass-based emission limits in Tables 4-15 for operation of MK1 and MK2 on any calendar day during which a startup or shutdown occurs. Year-round operation of the SCR controls is required by TV-0055 provided the ammonia injection permissive temperatures are reached. The Title V Permit requires the facility to continuously monitor the flue gas temperature at the SCR inlet to ensure that the ammonia injection is initiated upon reaching the respective SCR permissive temperature.

Table 4-15 provides a comparison of historical NO_X RACT Order based emission limits that applied to MK1 and MK2 prior to the 2018 amendments of Env-A 1300 and the currently applicable NO_X RACT limits. A request to withdraw the NO_X RACT Orders from the SIP was submitted to the EPA

61 The facility is limited to utilizing the alternative compliance option to no more than 7-boiler operating days during any consecutive 30-boiler operating day period.

on August 16, 2018. Env-A 1300 rule was submitted to the EPA as a SIP revision on September 6, 2018. In response to the MANE-VU "Ask", in 2019 NHDES amended Env-A 2300 and replaced the previous BART NO_X emission limit for MK2 which was 0.30 lb/MMBtu on a 30-day rolling average with the more restrictive NO_X RACT limits contained in Env-A 1300 and shown in Table 4-14 and Table 4-15. In 2019, NHDES amended New Hampshire's Code of Administrative Rules Env-A 2300, *Mitigation of Regional Haze* to include the new NO_X RACT limits for MK1. NHDES has revised Env-A 2300 to include the new NO_X RACT limits for MK2 and intends to submit the rule to EPA as a SIP revision concurrently with the regional haze SIP.

Table 4-15: Reductions in Allowable NOx RACT Emission Limits for MK1 and MK2 Over Time

Emission Unit	NO_X RACT Orders ARD-97-0001 & ARD-98-0001	Env-A 1300 (effective 8-15-2018)
MK1	1.22 lb/MMBtu (rolling 7-calendar day average) 18.1 tons per calendar day (when MK2 is not in full operation) 29.1 tons per calendar day (when combined with MK2)	0.22 lb/MMBtu (24-hour calendar day average) 4.0 tons per day on any calendar day during which a startup or shutdown occurs
MK2	15.4 tons per 24-hour calendar day 29.1 tons per calendar day (when combined with MK1)	0.22 lb/MMBtu (24-hour calendar day average) 11.5 tons per day on any calendar day during which a startup or shutdown occurs

Operation of the FGD system fulfills this facility's requirements for BART under EPA's Regional Haze Rule. BART emission limits are specified in New Hampshire's Code of Administrative Rules Env-A 2300, *Mitigation of Regional Haze*. Specifically, Env-A 2300 required SO_2 emission limits be specified in permit conditions established in accordance with Env-A 600. Therefore, NHDES issued Temporary Permit TP-0189 in 2016 which established the maximum sustainable rate of SO_2 emission reductions from MK1 and MK2 to minimize emissions that contribute to regional haze. In the same permit, NHDES also established an SO_2 emission limit that is based on a 7-boiler operating day rolling average and protective of the 1-hr SO_2 NAAQS for all potential operating scenarios at Merrimack Station. This was New Hampshire's primary control strategy to meet the 2010 1-hour SO_2 NAAQS. These limits as well as year-round operation of the FGD are included in the facility's Title V Operating Permit TV-0055 which was issued July 30, 2020. GSP Merrimack must balance the operation of the FGD such that both mercury emission reductions as required by the Federal Mercury and Air Toxics Standards (40 CFR 63 Subpart UUUUU) and the SO_2 emission limits contained in TV-0055 are achieved.

Based on the discussion above and the four-factor analysis from GSP, NHDES has determined that the existing pollution control equipment installed on MK1 and MK2 and the federally enforceable NO_X and SO_2 emission limits described above and contained in TV-0055 (Appendix V) satisfy "Ask #1" and ensure the most effective use of the control technologies. Therefore, no further emission limitations as a result of MANE-VU "Ask #1" are required of this source.

- **Granite Shore Power (GSP) Schiller Station**: GSP Schiller Station's operation is covered by Title V Operating Permit TV-0053 and NO_X RACT Orders RO-003 and ARD-06-001 which limit NO_X and SO_2 emissions to the limitations listed in Table 4-16.

Table 4-16: GSP Schiller Station Permitted Emissions and Control Technologies

Emission Unit	Pollutant	Limitation	Technology	Averaging Time
SR4 & SR6	NO_X	0.25 lb/MMBtu (for each unit)	LNB, OFA and SNCR	24-hr calendar day average[62]
SR4 & SR6	NO_X	0.46 lb/MMBtu (for each unit)	LNB, OFA and SNCR	Annual average[63]
SR5	NO_X	0.075 lb/MMBtu	SNCR	24-hr calendar day average[64]
		54.0 lb/hr		24-hr calendar day average
		236.5 tpy[65]		
SR5	NO_X	1.6 lb/MWh gross energy output	SNCR	30-day rolling average[66]
SR4 & SR6	SO_2	0.83 lb/MMBtu[67] (for each unit)	DSI	Boiler operating day average[68]
SR5[69]	SO_2	0.12 lb/MMBtu	Limestone Injection	24-hr calendar day average (when firing coal)
		0.02 lb/MMBtu		24-hr calendar day average (when firing wood)
		76.2 lb/hr		24-hr calendar day average
		333.8 tpy[65]		

On May 3, 2018, NHDES requested additional information from GSP regarding both NO_X RACT and Regional Haze Rule requirements associated with the MANE-VU "Ask". For SR4 and SR6, NHDES requested that GSP conduct a NO_X RACT analysis for optimization of the SNCR including an evaluation of the technical and economic feasibility of operating the SNCR systems on a year round basis to achieve various proposed NO_X emission levels. Also, GSP was requested to evaluate the most effective use of the DSI systems on SR4 and SR6 for SO_2 emission reductions. For "Ask #1" regarding SR5, NHDES requested GSP evaluate the most effective use of the SNCR for NO_X emission reductions and the limestone injection system for SO_2 emission reductions.

62 NOx RACT Order RO-003 issued September 6, 2018 established a NOx emission limit for SR4 and SR6 of 0.25 lbs NOx/MMBtu per 24-hour calendar day average that applies at all times, including periods of startup and shutdown on a year-round basis. This limit is more stringent than Env-A 1303.07 *RACT Requirements: Dry-Bottom Utility Boilers Firing Coal and/or Oil*.

63 NOx emission limit is required under the Federal Acid Rain NOx Emission Reduction Program 40 CFR 76.6(a)(2).

64 During periods of startup or shutdown, NOx emissions shall be limited to 0.15 lb/MMBtu based on a 24-hr calendar day average.

65 The term "tpy" is defined in the Title V Operating Permit as tons per consecutive 12-month period.

66 This limitation comes from 40 CFR 60, Subpart Da. Pursuant to 40 CFR 60.48Da(a), the NSPS NOx emission standard applies at all times except during periods of startup, shutdown, or malfunction.

67 This limit applies at all times, including startup and shutdown.

68 Boiler operating day means a 24-hour period that begins at midnight and ends the following midnight during which any fuel is combusted at any time in the boiler. It is not necessary for the fuel to be combusted the entire 24-hour period.

69 SR5 is also subject to 40 CFR 60 Subpart Da emission standards for SO_2.

On May 25, 2018 and August 31, 2018, GSP provided analyses that demonstrated that operation of low NO_X burners (LNB) and OFA on SR4 and SR6 were sufficient to achieve an emission limit of 0.25 lbs NO_X/MMBtu and that year-round operation of the SNCR was not economically feasible[70]. NHDES issued NO_X RACT Order RO-003 on September 6, 2018 which established a NO_X emission limit for SR4 and SR6 of 0.25 lbs/MMBtu per 24-hour calendar day average that applies at all times, including periods of startup and shutdown on a year-round basis. New Hampshire submitted this NO_X RACT Order as a single-source SIP revision in September 2018. It was approved by the EPA on September 12, 2019 [84 FR 48068].

In addition, GSP evaluated the most effective use of the DSI systems on SR4 and SR6. The DSI systems were installed for the purpose of complying with the federal MATS rule, 40 CFR 63, Subpart UUUUU *National Emission Standards for Hazardous Air Pollutants (NESHAP): Coal- and Oil-Fired Electric Utility Steam Generating Units*. The DSI systems are intended to reduce hydrogen chloride (HCl) emissions but have the co-benefit of reducing SO_2 emissions. The SO_2 emission limit in Table 4-16 for SR4 and SR6 was derived to ensure compliance with the *Data Requirements Rule for the 2010 1-Hour SO_2 Primary NAAQS* [80 FR 51052]. Since the DSI systems are already required to operate at a set minimum sorbent injection rate to reduce HCl emissions, the SO_2 emissions are managed by automatically injecting incremental additional sorbent using emissions feedback from the SO_2 Continuous Emission Monitoring System (CEMS). SR4 and SR6 comply with the most current and strict federal standards for acid gases the HCl limit required under MATS and the 1-hr SO_2 NAAQS. GSP Schiller Station implements the most effective use of the existing control technology, which is year-round operation of the DSI systems, targeting reduction of multiple acid gases. GSP Schiller Station must balance operation of the DSI systems with operation of other emission controls (i.e., Activated Carbon Injection system) to avoid adverse impacts on mercury removal or overloading the ESP with particulate matter.

SR5 is a wood-fired boiler that is also permitted to fire coal. However, SR5 has only fired coal for collecting performance test data in November 2006 during commissioning of the boiler. GSP has not combusted coal in SR5 since then. Based on compliance stack testing and emissions monitoring data, sorbent injection is not needed to comply with the SO_2 emission limit while burning biomass.

NHDES issued NO_X RACT Order ARD-06-001 on August 4, 2006. ARD-06-001 established a NO_X emission limit for SR5 of 0.075 lbs/MMBtu per 24-hour calendar day average that applies at all times, except during periods of startup and shutdown. New Hampshire submitted this NO_X RACT Order as a single-source SIP revision in August of 2006. It was approved by the EPA on November 5, 2012 [77 FR 66388]. On September 27, 2011, NHDES issued Temporary Permit TP-0085 that established a separate, federally-enforceable NO_X emission standard of 0.15 lb/MMBtu based on a 24-hr calendar day average that applies during periods of startup or shutdown.[71]

70 *Granite Shore Power Regional Haze and NOx RACT Letters.* (July 25, 1994, May 25, 2018, August 30, 2018, January 17, 2020 and October 18, 2021). Appendix T.

71 This limit shall apply only during the calendar days on which the startup or shutdown is occurring, not to exceed two calendar days per startup or shutdown. Startup is defined as the period from when fuel is first fired in the boiler to when the unit begins generating electricity at 50% capacity (25 MW). Shutdowns related to malfunctions are not eligible for the startup/shutdown emission limit.

NHDES has determined that the existing pollution control equipment (LNB, OFA, SNCR and DSI) installed on SR4, SR5 and SR6, the federally enforceable NO_X RACT emission limits contained in RO-003 and ARD-06-001 and the NO_X and SO_2 emission limitations required by TV-0053 on a year-round basis satisfy "Ask #1" and ensure the most effective use of the control technologies. (Appendix V).

- **Granite Shore Power (GSP) Newington Station**: GSP Newington Station's operation is covered by Title V Operating Permit TV-0054. The unit subject to "Ask #1" at this facility is an oil- and natural gas-fired EGU designated as NT1. NT1 is equipped with an ESP to control the emissions of particulate matter and LNB, OFA and water injection system to control NO_X emissions. GSP operates the water injection system on NT1 as necessary to maintain compliance with the NO_X emission limits. TV-0054 contains NO_X emission limitations of 0.35 lbs/MMBtu based on a 24-hour calendar day average when firing oil and 0.25 lbs/MMBtu based on a 24-hour calendar day average when firing gas or any combination of oil and gas. NT1 is subject to MATS as an existing EGU under the "limited-use liquid oil-fired EGU[72]" subcategory. TV-0054 contains a requirement to conduct a NO_X RACT analysis within six months of switching from the limited use MATS subcategory to continental liquid oil-fired EGU subcategory should they ever do so. NT1 does not have SO_2 controls and therefore "Ask #1" does not apply.

  NHDES has determined that the existing pollution control equipment (LNB, OFA and water injection system) installed on NT1 combined with the federally enforceable NO_X emission limitations required by TV-0054 (Appendix V) on a year-round basis satisfy "Ask #1" and ensure the most effective use of the control technologies.

Additional Facilities Identified by the FLM

All of the New Hampshire sources listed in Table 2-6 which have maximum estimated visibility extinction above 1 Mm^{-1} (the MANE-VU screening criteria used for further evaluation) at Federal Class I areas were evaluated by NHDES in accordance with the MANE-VU "Ask" as outlined here. The National Park Service, through consultation with New Hampshire, also identified Wheelabrator Concord as a facility of interest even though the maximum estimated visibility extinction level for this facility was not above the MANE-VU screening criteria.

- **Wheelabrator Concord:** Wheelabrator Concord's operation is covered by Title V Operating Permit TV-0032 which was issued January 24, 2019. The two identical mass burn waterwall boilers at Wheelabrator Concord are considered large municipal waste combustors under New Hampshire's Code of Administrative Rules Env-A 3300, *Municipal Waste Combustion*. The current NO_X emission limitation in TV-0032 is 205 parts per million by volume on a dry basis (ppmvd), corrected to 7% O_2, and is on a 24-hour daily arithmetic average. The current SO_2 emission limitation in TV-0032 is 29 ppm by volume (ppmv), or 25% of the potential SO_2 emission concentration, corrected to 7% O_2 (dry basis) on a 24-hour daily block geometric average concentration or percent reduction basis.

72 *Limited-use liquid oil-fired subcategory* means an oil-fired electric utility steam generating unit with an annual capacity factor when burning oil of less than 8 percent of its maximum or nameplate heat input, whichever is greater, averaged over a 24-month block contiguous period.

The two Municipal Waste Combustion (MWC) units at Wheelabrator Concord are also subject to New Hampshire's Code of Administrative Rules Env-A 1300, *NO_X RACT*. Env-A 1300 was revised in 2018 as part of New Hampshire's SIP for the 2008 and 2015 8-hr ozone standards. As part of the 2018 revision to the NO_X RACT rule, NHDES amended Env-A 1309, *Incinerators*. Effective August 15, 2019, an incinerator shall not exceed a 24-hour calendar day average NO_X RACT emission limit of 150 ppmvd at 7% O_2, except during days with periods of startup or shutdown; and during calendar days with periods of startup or shutdown, shall not exceed a 24-hour calendar day average NO_X mass emission rate (lbs/hr) calculated as the equivalent of 205 ppmvd at 7% O_2 and the maximum heat input rate for the incinerator (MMBtu/hr). The Env-A 1300 rule was submitted to the EPA as a SIP revision on September 6, 2018 and the NO_X RACT limits will be incorporated into the Title V permit.

Internal CALPUFF modeling performed by NHDES using the current permitted NO_X and SO_2 limits showed 0.15 Mm^{-1} impact at Acadia, 0.19 Mm^{-1} impact at Great Gulf and 0.29 Mm^{-1} impact at Presidential Range/Dry River. The additional NO_X reductions required of Wheelabrator Concord should result in even lower impacts at these Class I areas.

NHDES has determined that no further limitations as a result of MANE-VU "Ask #1" are required of this source. The federally enforceable limits are contained in Title V Operating Permit TV-0032 (Appendix V).

2. *Emission sources modeled by MANE-VU that have the potential for 3.0 Mm^{-1} or greater visibility impacts at any MANE-VU Class I area, as identified by MANE-VU contribution analyses – perform a four-factor analysis for reasonable installation or upgrade to emission controls.*

   The one EGU located at a New Hampshire stationary source that was identified as meeting the criteria of "Ask #2" is listed in Table 4-17, however GSP Merrimack Station submitted a four-factor analysis for both MK1 and MK2**:**

Table 4-17: New Hampshire Units Subject to MANE-VU "Ask #2"

Facility	Unit
GSP Merrimack Station	MK2

- **GSP Merrimack Station**: As noted above, GSP Merrimack Station's operation is covered by Title V Operating Permit TV-0055 which limits NO_X and SO_2 emissions to those listed in Table 4-14. MK1 and MK2 are cyclone-firing, wet-bottom utility boilers that burn bituminous coal and are each equipped with SCR for NO_X control as well as ESPs for particulate matter control. In addition, as a result of state law RSA 125-O, *Multiple Pollutant Reduction Program*, MK1 and MK2 are equipped with a common FGD system which is designed to reduce mercury emissions but has the co-benefit of acid gas (SO_2 and HCl) removal.

  On May 3, 2018, NHDES requested additional information from GSP regarding both NO_X RACT and Regional Haze Rule requirements associated with the MANE-VU "Ask." For "Ask #2" regarding MK2, the request for additional information was focused on a four-factor analysis for reasonable installation or upgrade to emission controls.

In their August 31, 2018 response[73] to NHDES, GSP provided the following technological justifications for why fuel switching or addition of OFA would result in minimal additional NO_X reductions when installed after the SCR systems are already in operation on MK1 and MK2:

> "Addition of OFA or switching fuels would cause operational issues and reduce the efficiency of other pollution control devices. Switching to sub-bituminous coal would result in a loss of boiler efficiency and a probable increase in heat rate. This would require Merrimack Station to burn more fuel, causing an increase in emissions. It would also impact Merrimack Station's mercury capture and the efficiency of the ESP. Overall, this fuel would not provide reliable unit operations and would not be considered a viable alternative to the current use of bituminous coal.
>
> OFA would result in reduced boiler performance, potential boiler modifications to boiler surface areas, increased fouling, boiler tube erosion, and cyclone wear. Any installation is complicated by, if not impossible, due to the engineering and design challenges of the windbox configuration and screen tubes at Merrimack. In addition, the installation of an OFA system after the installation of an SCR is likely to produce little to no improvement in NOx reductions. Any of these changes would also have the potential to negatively impact the removal capability of the FGD and the collection capability of the ESPs."

Earlier evaluation of several NO_X control technologies was conducted at the facility in 1992 prior to the installation of the SCR systems on MK1 and MK2.[74] At that time, LNB, OFA, FGR, SCR, SNCR, reburn NO_X control technologies, fuel switching, and operating at reduced loads were evaluated, but ultimately SCR was chosen as the most viable means of reducing NO_X emissions to the levels required for CAA compliance at the time. Supplemental analysis of the feasibility of additional or alternative NO_X controls for Merrimack Station were submitted in a letter dated January 17, 2020. In that letter, GSP mentions the 1992 NO_X control technology evaluation and provides additional technical limitations to OFA, reburn, fuel switching, and SNCR. In the letter, GSP states that:

> "An internal engineering team conducted a preliminary engineering feasibility study of potential further NO_X emission reduction in 2012. The engineering study team visited other cyclone boiler EGUs which had installed OFA. In each case, OFA was installed prior to installation of the SCR, not after. From field visits and discussions with industry experts, it was learned that OFA technology was developed to meet the requirements of Title IV while avoiding the high capital cost of installing SCR. Industry experts indicated they were not aware of any cyclone boiler in the US that had installed OFA after an SCR was in service and questioned the feasibility and merits in doing so."

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73 *Granite Shore Power Regional Haze and NOx RACT Letters.* (July 25, 1994, May 25, 2018, August 30, 2018, January 17, 2020 and October 18, 2021). Appendix T.

74 *Granite Shore Power Regional Haze and NOx RACT Letters.* (July 25, 1994, May 25, 2018, August 30, 2018, January 17, 2020 and October 18, 2021). Appendix T.

In the January 17, 2020 letter, GSP further explained the technical challenges associated with OFA and the marginal increase in NO_X capture that would result. In addition, GSP completed a four-factor analysis for NO_X and SO_2 for MK1 and MK2 (Appendix T). The four-factor analysis for NO_X included review of fuel switching, OFA, SNCR, reburn, and upgrades to the existing SCR, however all options were deemed technically infeasible to improve NO_X emissions. Also the analysis for SO_2 controls considered upgrades to the existing FGD, coal cleaning, dry FGD, FGD plus DSI and fuel switching. There were no alternatives to reduce SO_2 emissions that were technically feasible. Therefore, the four-factor analysis validates the continued use of current enforceable measures for both SO_2 and NO_X.

MK2 is subject to New Hampshire's Code of Administrative Rules Env-A 2300, *Mitigation of Regional Haze,* which established BART emission limits. In response to the MANE-VU "Ask," in 2019 NHDES amended Env-A 2300 and replaced the previous BART NO_X emission limit for MK2 which was 0.30 lb/MMBtu on a 30-day rolling average with the more restrictive NO_X RACT limits contained in Env-A 1300 (see Table 4-15).

NHDES has closely reviewed the documentation and four-factors analysis submitted by GSP and concluded that the existing pollution control equipment installed on MK1 and MK2 and the federally enforceable NO_X and SO_2 emission limits described above and contained in TV-0055 (Appendix V) satisfy "Ask #2" and therefore, no upgrade or replacement of the controls on MK1 and MK2 as a result of MANE-VU "Ask #2" are required of this source.

3. *Adopt an ultra-low sulfur fuel oil standard as requested by MANE-VU in 2007.*

   The ultra-low sulfur fuel oil portion of the 2017 MANE-VU "Ask" has been fulfilled. New Hampshire has amended state law RSA 125-C:10-d, *Sulfur Limits of Certain Liquid Fuels*. Beginning on July 1, 2018, fuel imported into New Hampshire is required to meet the following reduced sulfur limits – 0.0015% for No. 2 fuel oil, 0.25% for No. 4 fuel oil and 0.5% for Nos. 5 or 6 fuel oil. Beginning on February 1, 2019, non-compliant fuels are not allowed to be distributed for sale within the State. This law will result in further reductions in SO_2 emissions from industrial, area, and non-road sources beyond the 30% reduction seen in the 2008 vs. 2014 NEI data. The law was incorporated into New Hampshire's Code of Administrative Rules Env-A 1600, *Fuel Specifications* and was submitted to the EPA as a SIP revision on May 17, 2019. The SIP revision was approved by EPA on April 26, 2021 [86 FR 21942]. MANE-VU projected this strategy would result in a 28% reduction in non-EGU SO_2 emissions by 2018, relative to on-the-books/on-the-way 2018 projections used in regional haze planning.

4. *EGUs and other large point emission sources greater than 250 MMBTU per hour heat input that have switched operations to lower emitting fuels – lock-in lower emission rates for SO_2, NOx and particulate matter.*

   There are no facilities in New Hampshire that meet the specifications of this provision.

5. *Where emission rules have not been adopted, control NOx emissions for peaking combustion turbines that have the potential to operate on high electric demand days by:*

   a. *Striving to meet NOx emissions standard of no greater than 25 ppm at 15% O_2 for natural gas and 42 ppm at 15% O_2 for fuel oil but at a minimum meet NOx emission standard of no greater than 42 ppm at 15% O_2 for natural gas and 96 ppm at 15% O_2 for fuel oil, or*
   b. *Performing a four-factor analysis for reasonable installation or upgrade to emission controls, or*
   c. *Obtaining equivalent alternative emissions reductions on high electric demand days.*

   The peaking combustion turbines located at New Hampshire stationary sources that were identified as meeting the criteria of "Ask #5" are listed in Table 4-18.

Table 4-18: New Hampshire Units Subject to MANE-VU "Ask #5"

Facility	Unit
GSP Lost Nation Station	LNCT1
GSP Merrimack Station	MKCT1
	MKCT2
GSP Schiller Station	SRCT
GSP White Lake Station	WLCT1

   NHDES has closely reviewed and adopted the four-factor analyses for reasonable installation or upgrade to NO_X emission controls performed by the operator. (Appendix T). GSP's five combustion turbines are of the same vintage (installed 1968 – 1970), have similar unit ratings (290 MMBtu/hr – 319 MMBtu/hr), are operated in the similar manner (operate less 1% of the number of hours in a given year), and have similar NOx emissions (ranging from 0.7 lbs/MMBtu to 0.9 lbs/MMBtu). The analyses indicated that there are no additional NOx controls that GSP could employ on the combustion turbines that are both technically and economically feasible. Alternatively, GSP has pledged to continue employing good combustion practices to optimize their NOx emissions profile.

6. *Each State should consider and report in their SIP measures or programs to: a) decrease energy demand through the use of energy efficiency, and b) increase the use within their state of Combined Heat and Power (CHP) and other clean Distributed Generation technologies including fuel cells, wind, and solar.*

   - New Hampshire participates in RGGI, a Northeast and Mid-Atlantic 10-state initiative to reduce greenhouse gas emissions that contribute to global climate change. The initiative creates a market for emissions allowances through a regional cap-and-trade program for greenhouse gas emissions from area power plants. As a co-benefit of this program, emissions of particle producing pollutants are also reduced. New Hampshire emissions allowances are sold at quarterly auctions and the proceeds fund the Greenhouse Gas Emission Reduction (GHGER) Fund. The GHGER Fund is administered by the Public Utilities Commission, which distributes the funds to programs across the state to support energy efficiency, conservation, and demand response programs.

- New Hampshire's Renewable Portfolio Standard (RPS) statute, RSA 362-F: *Electric Renewable Portfolio Standard*, requires each electricity provider to meet customer load by purchasing or acquiring certificates representing generation from renewable energy based on total megawatt-hours supplied. The RPS requirement increases from 4% in 2008 to 25.2% in 2025 and thereafter, based on type of renewable energy. A portion of this renewable portfolio energy generation comes from non-emitting sources such as hydro, solar and wind.

4.2.10 Long-Term Strategy (LTS) for New Hampshire

During the second implementation period, in addition to the strategies enacted during the first implementation period, New Hampshire will adopt and follow federally enforceable strategies for controlling pollutants that cause visibility impairment including:

- **Lower sulfur fuels** – Through the amendment of state law RSA 125-C:10-d, *Sulfur Limits of Certain Liquid Fuels* and incorporation into Env-A 1600, *Fuel Specifications*, New Hampshire has lowered the allowable sulfur content of fuels distributed in and used throughout the State. Reduced sulfur content in Nos. 2, 4, 5 and 6 fuel oil will result in improvements in SO_2 emissions from industrial, area and non-road sources.
- **Reduced NO_X limits** – Env-A 1300, *NO_X RACT*, was revised in 2018 and includes reduced NOx limitations for several source types including: MWCs, older load shaving gas-fired prime power engines, older load shaving liquid-fired prime power engines meeting Tier II emissions and cyclone-firing wet bottom utility boilers firing coal. Implementation of lower NOx limits will reduce NOx emissions from the listed industries.
- **EGU Stationary Source Improvements** – One facility has a more stringent NOx limit implemented through Env-A 2300, *Mitigation of Regional Haze*:
  - Stored Solar Tamworth – The facility has accepted a more stringent year round NOx limit of 0.075 lb/MMBtu, on a quarterly average, lowered from 0.765 lb/MMBtu.

4.3 Reasonable Progress Goals (RPGs)

40 CFR §51.308 (f)(3) of the Regional Haze Rule requires New Hampshire to establish, for each Federal Class I area within the State, RPGs that reflect the visibility conditions in 2028 that are expected to result from the measures outlined in the LTS. EPA’s 2019 Guidance provided criteria to be used by states in setting RPGs. The goals must provide for visibility improvement on the days of greatest visibility impairment, specifically, when anthropogenic emissions impair visibility and away from days when wildfires and natural dust storms are the greatest contributors to visibility impairment and ensure no visibility degradation on the days of least visibility impairment for the duration of the SIP period.

As provided in 40 CFR §51.308 (f)(3)(i):

> "A state in which a mandatory Class I Federal area is located must establish reasonable progress goals (expressed in dv) that reflect the visibility conditions that are projected to be achieved by the end of the applicable implementation period as a result of those enforceable emissions limitations, compliance schedules, and other measures required under paragraph (f)(2) of this section that can be fully implemented by the end of the applicable implementation period, as well as the implementation of other requirements of the CAA. The long-term strategy and the reasonable progress goals must provide for an improvement in visibility for the most impaired days since the baseline period and ensure no degradation in visibility for the clearest days since the baseline period."

Table 4-19 summarizes the existing visibility conditions and the proposed goals as described in this section and seen in Figure 4-2.

Table 4-19: Visibility Goals for the Great Gulf and Presidential Range/Dry River Wilderness Areas

Conditions	Deciviews (dv)
Natural Background on 20% most impaired visibility days (Goal in 2064)	9.78
Average Baseline Visibility on the 20% clearest days (2000-2004)	7.65
Average Baseline Visibility on the 20% most impaired days (2000-2004)	21.88
Uniform Rate of Progress for 2018 on the 20% most impaired days*	19.06
Current 20% Most Impaired Days (2015-2019)	12.33
Uniform Rate of Progress for 2028 on the 20% most impaired days*	17.04
Modeled Reasonable Progress Goal (2028)*	12.00[c] / 12.13[d]

* Average annual value
[c] Modeled with the MANE-VU "Ask" measures (Appendix U)
[d] Modeled without the MANE-VU "Ask" measures (Appendix U)

The amount of visibility improvement on the 20% most impaired days from baseline (21.88 dv) to 2028 based on URP glideslope of 0.202 dv per year is 4.84 dv. The 2028 URP target value is 17.04 dv. MANE-VU predicts 2028 RPGs of 12.00 dv with the MANE-VU "Ask" and 12.13 dv without.

New Hampshire consulted with states identified as contributing to visibility impairment at New Hampshire's Class I areas and with states that requested consultation with New Hampshire regarding visibility conditions at their Federal Class I areas. In particular, New Hampshire worked closely with the other MANE-VU states to ensure consistency of approach in setting RPGs. A description of the consultation process is found in Section 3. Should other Federal Class I area states that have not yet completed their consultation processes request consultation with New Hampshire as well as request that additional emission measures be considered, then NHDES will address the matter in a SIP update, permit or rule as needed and appropriate.

4.4 Additional Monitoring

As described in earlier sections, visibility monitoring at Great Gulf Wilderness and Presidential Range - Dry River Wilderness is accomplished with instruments located at a single site at Camp Dodge and is funded by EPA and operated by the National Forest Service. This monitoring station, which represents both wilderness areas, measures and records light scattering, aerosols and relative humidity. The collected data are compiled and sorted to ascertain visibility levels on the 20% most impaired and clearest days, and this information is tracked over time to look for trends in visibility. The parameters and instrumentation for this site are listed in Table 4-20 below.

Table 4-20: Visibility Monitoring at Great Gulf and Presidential Range – Dry River Wilderness Areas

Parameter	Instrument
Scattering coefficient	Nephelometer
Aerosol	IMPROVE module A
Aerosol	IMPROVE module B
Aerosol	IMPROVE module C
Aerosol	IMPROVE module D
Meteorology	Relative humidity

The State has not been advised by the Administrator, Regional Administrator, or affected FLM that additional monitoring is required pursuant to 40 CFR §51.308(f)(4). Therefore, New Hampshire has no current plans to alter the current strategy as long as this monitoring continues to be federally supported.

5 PROGRESS REPORT AND PERIODIC REPORTS

New Hampshire commits to periodically submitting reports to the Administrator evaluating progress towards the RPG for each mandatory Federal Class I area located within the State and in each mandatory Federal Class I area located outside the State that may be affected by emissions from within the State. Subsequent progress reports will be submitted January 31, 2025, July 31, 2033, and every 10 years thereafter. Progress reports will be made available for public inspection and comment for at least 30 days prior to submission to EPA and all comments received from the public will be submitted to EPA with the subsequent progress report, along with an explanation of any changes to the progress report made in response to those comments.

The Regional Haze Rule at 40 CFR §51.308(f)(5) states "So the plan revision will serve also as a progress report, the State must address in the plan revision the requirements of paragraphs (g)(1) through (g)(5) of this section." The first progress report was submitted December 16, 2014 (Appendix X). The following section serves as a second progress report to the first implementation period (2008-2018) and covers 2015 – 2019.

5.1 Implementation Status of Measures Included in State Implementation Plan

Measures to combat regional haze were developed by the MANE-VU states after much research and analysis that culminated on June 20, 2007 with the adoption of two documents that provide the technical basis for consultation among the interested parties and define the basic strategies for controlling pollutants that cause visibility impairment at Federal Class I areas in the eastern U.S. These documents, "Statement of the Mid-Atlantic / Northeast Visibility Union (MANE-VU) Concerning a Course of Action within MANE-VU toward Assuring Reasonable Progress," and "Statement of the Mid-Atlantic / Northeast Visibility Union (MANE-VU) Concerning a Request for a Course of Action by States outside of MANE-VU toward Assuring Reasonable Progress" are known as the MANE-VU "Ask" (not to be confused with the "Asks" for the current planning period, which were described in Section 4).

During the first implementation period, New Hampshire, as a MANE-VU member state, agreed to and adopted the strategies for controlling pollutants that cause visibility impairment outlined in the first planning period "Ask." As required by 40 CFR §51.308(g)(1), the implementation status of the strategies included in the "Ask" is as follows:

- **Timely implementation of BART requirements.** New Hampshire met the terms of this agreement by controlling its two in-state BART-eligible emission sources with timely control strategies. Both BART-eligible sources also fell on the list of the top 167 contributing EGU emission points for the current planning period.
- **A targeted EGU strategy:** The larger of these facilities (Merrimack Station Unit MK2) was subject to amendments of New Hampshire state statute RSA 125-O, *Multiple Pollutant Reduction Program* in 2006 that imposed emission caps on $SO_2$and NO_X from fossil-fuel-fired EGUs, and required an 80% reduction in mercury emissions from coal burning EGUs. To reduce mercury emissions, Merrimack Station installed a wet, limestone-based FGD that went on line in November 2011. The removal of SO_2 occurs as a co-benefit of the FGD system. In 2019, Merrimack Station's SO_2 emissions were 200 tons which is 99% lower than the emissions of 33,248 tons in 2010. This reduction is greater than the 90% specified in the "Ask"; please see

Table 2 of Appendix M[75].

The other facility, oil-fired unit NT1 (GSP Newington Station), must meet BART SO_2 emission limit of 0.50 lb/MMBtu based on a 30-day rolling average. In 2018, the facility's Title V permit was updated with the new low sulfur fuel oil limits of RSA 125-C:10-d, *Sulfur Limits of Certain Liquid Fuels* (see below for new sulfur limits). The facility's current Title V permit specifies the #6 fuel oil used by its utility boiler contain less than 0.5% sulfur, and the #2 fuel oil used for its two auxiliary boilers contain less than 0.0015% sulfur. NT1 also appears on the list of units with 90% or greater SO_2 emissions reductions between 2002 and 2015 (Table 2 of Appendix M).

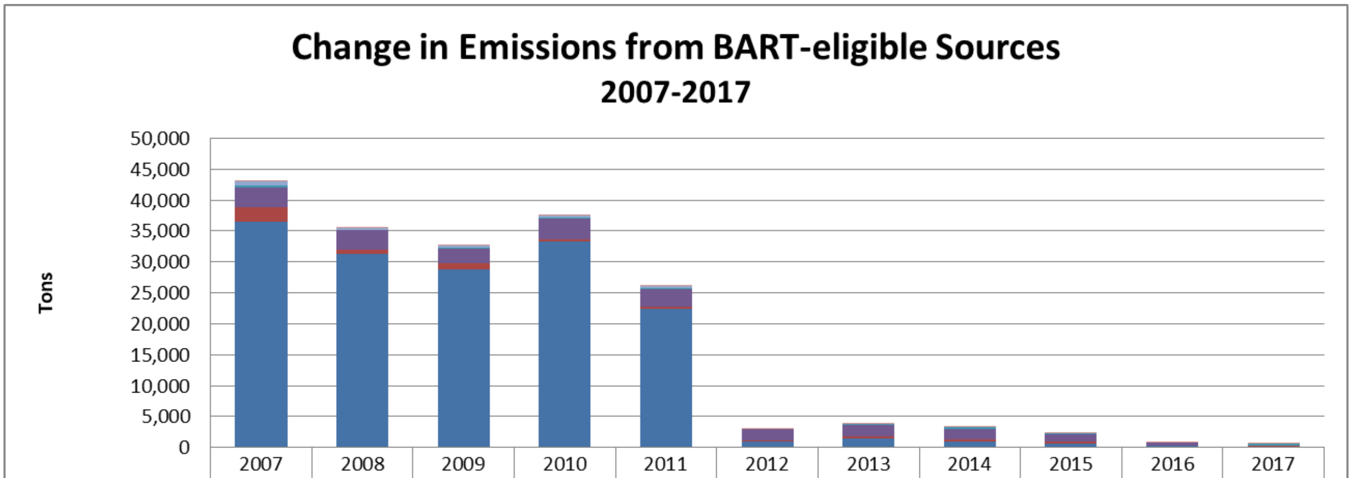
- **An ultra-low sulfur fuel oil strategy.** In 2016, New Hampshire amended the statute RSA 125-C:10-d, *Sulfur Limits of Certain Liquid Fuels*. Effective July 1, 2018, fuel imported into New Hampshire must have a reduced sulfur limit – 0.0015% for No. 2 fuel oil, 0.25% for No. 4 fuel oil and 0.5% for Nos. 5 or 6 fuel oil. Beginning February 1, 2019, no person shall distribute fuel in the State that does not meet these sulfur limits. This law will result in further reductions in SO_2 emissions from industrial, area, mobile and non-road sources beyond the 30% reduction seen in the 2008 vs. 2014 NEI data.
- **Continued evaluation of other control measures.** New Hampshire continues its participation in "Clean Cities," the U.S. Department of Energy's (DOE's) program that advances the nation's economic, environmental and energy security by supporting local actions to cut petroleum use in transportation. In 2016, New Hampshire amended the statute RSA 125-C:10-a, *Municipal Waste Combustion Units* and the corresponding CAA Section 129-state plan for municipal waste combustors to align the standards for small MWCs with those of large MWCs. This revision resulted in a decrease in the allowable particulate matter emission rate from 27 mg/dscm to 25 mg/dscm (corrected to 7% O_2) in addition to reductions in allowable emission rates for other pollutants. Finally, New Hampshire strengthened its rules concerning New Hampshire's Code of Administrative Rules Env-A 2300, *Mitigation of Regional Haze*, Env-A 1000, *Prevention, Abatement, and Control of Open Source Air Pollution* and Env-A 2800, *Sand and Gravel Sources: Non-Metallic Mineral Processing Plants; Cement and Concrete Sources*.

5.2 Summary of Emission Reductions Achieved

40 CFR §51.308(g)(2) calls for summary of the emissions reductions achieved throughout the State through implementation of the measures described in Section 5.1. The low sulfur fuel oil strategy was fully implemented by amended state law (RSA 125-C:10-d, *Sulfur Limits of Certain Liquid Fuels*) by the end of 2018, but the actual transition to lower sulfur fuels began years earlier as distributors found it to be more cost effective to provide a common product throughout the multi-state region. The visibility benefits of this phase-in are seen in some of the rate of progress experienced since 2010. Also, measured visibility improvement from emission reductions at two New Hampshire EGUs that were subjected to BART and other targeted strategies (Figure 5-1) addressed three visibility impairing pollutants (SO_2, NO_X and particulate matter).

[75] MANE-VU, (July 2016). *Status of the Top 167 Electric Generating Units (EGUs) that Contributed to Visibility Impairment at MANE-VU Class I Areas during the 2008 Regional Haze Planning Period*. Appendix M.

Figure 5-1: Emissions in SO_2, NO_X and PM from Two New Hampshire EGUs, 2007-2017 (tpy)



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Newington PM	101	25	51	18	17	1	2	3	3	1	8
Merrimack PM	656	334	321	374	277	23	53	40	23	7	1
Newington NOx	419	114	237	187	121	66	89	181	168	47	268
Merrimack NOx	3,226	3,161	2,307	3,416	2,953	1,835	1,950	1,689	1,169	549	48
Newington SO2	2,273	595	976	326	308	102	331	316	295	41	263
Merrimack SO2	36,486	31,307	28,843	33,248	22,392	1,004	1,401	1,044	636	228	41

The summary of statewide emissions of visibility impairing pollutants from all sources and activities for the period from 2002 to 2017 is provided in Section 5.4 and is based on NEI data. For the period 2008 to 2014, one can observe statewide emissions reductions of 25%, 32% and 80% for NO_X, particulate matter, and SO_2, respectively, while the EGU specific emissions decreased by 43%, 88% and 96% for the same time period, indicating the effect of these sources on the statewide inventory.

5.3 Assessment of Visibility Conditions

40 CFR §51.308(g)(3) requires assessment of visibility conditions and changes for each Federal Class I area within the State. Haze Index and individual constituent light extinction annual results were analyzed for each IMPROVE monitoring site in and adjacent to the MANE-VU region for years between 2000 and 2019. This work was completed by the ME DEP on behalf of MANE-VU[76] to determine baseline, current and natural visibility conditions for the 20% most impaired days and the 20% clearest days, for each in-state and out-of-state Federal Class I area for states in the MANE-VU region.

Visibility trends analyses used recommended metrics from EPA's 2018 Technical Guidance at IMPROVE monitoring sites at federal Class I including New Hampshire's Federal Class I areas. The results of the analysis showed the following:

- There continues to be definite downward trends in overall haze levels at all Federal Class I areas in and adjacent to the MANE-VU region and at IMPROVE Protocol monitoring sites.

[76] MANE-VU, (January 2020 revision). *Mid-Atlantic/Northeast U.S. Visibility Data 2004-2019 (2nd RH SIP Metrics)*, Appendix B.

- Based on rolling-five year averages demonstrating progress since the 2000-2004 baseline period, all MANE-VU and nearby Federal Class I area visibility conditions are currently better than the 2028 URP visibility condition for the 20% most impaired visibility days and below baseline conditions for the 20% clearest days. Trends are mainly driven by large reductions in sulfate light extinction, and to a lesser extent, nitrate light extinction.
- Levels of Organic Carbon Mass and Light Absorbing Carbon appear to be approaching natural background levels at most of the MANE-VU Class I areas.
- The percent contribution of nitrate light extinction has been significantly increasing at some of the MANE-VU Class I areas not just due to lower sulfate contributions but due to more winter days and fewer summer days in the mix of 20% most impaired days.

Visibility metrics for Federal Class I areas in and adjacent to MANE-VU are given in Table 5-1. For the Great Gulf Wilderness, these metrics are presented graphically in Figure 5-2. As shown, visibility trends for the 20% most impaired days are well below the URP line as an annual average as well a five-year rolling average.

Great Gulf/Presidential Range haze index levels have dropped 2.96 dv from the baseline level on the clearest days. Haze index levels on most impaired days have declined 9.55 dv from baseline. This represents a decrease of 40-55% between the baseline and the current time period.

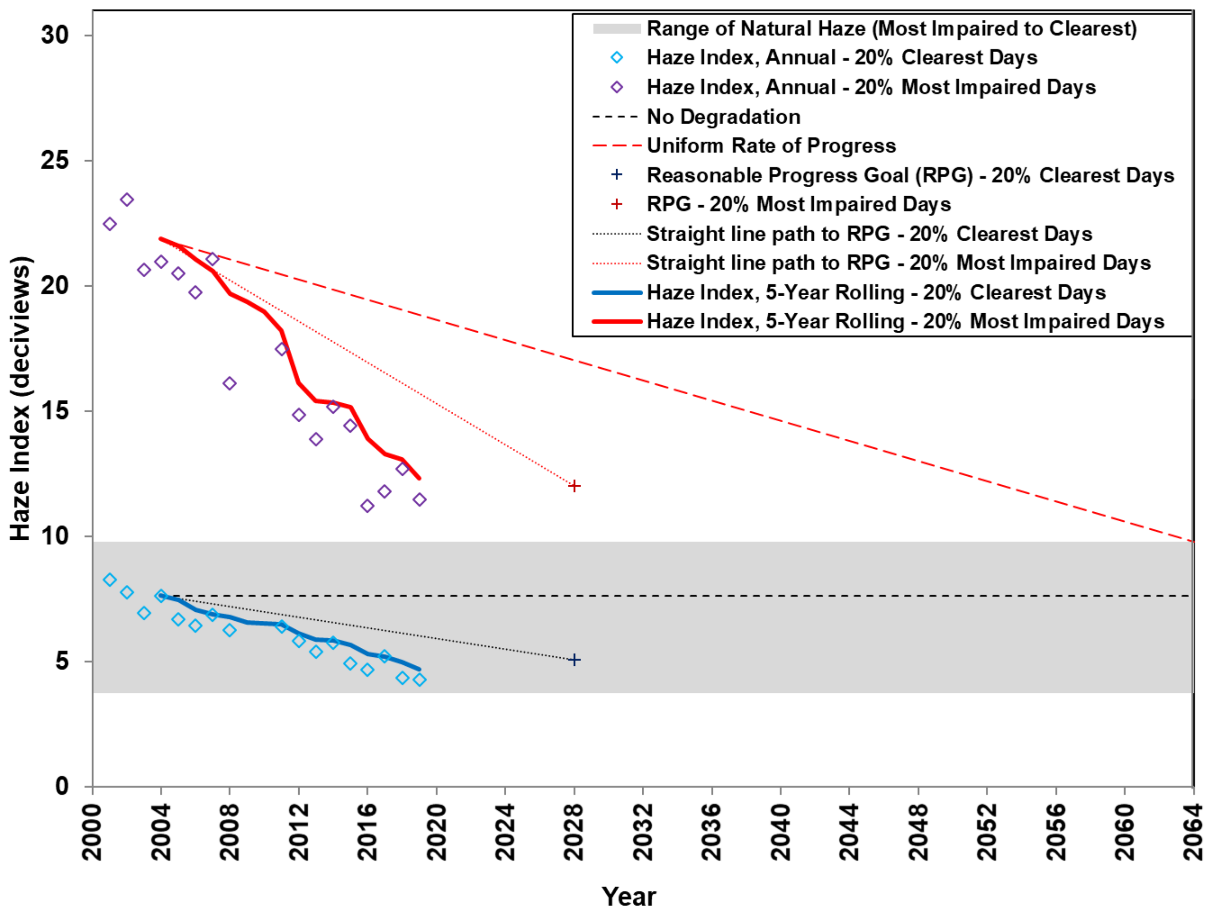
For the time period (2009-2013 5-yr average) which was addressed New Hampshire’s most recent progress report (December 2014, Appendix X), haze index levels for Great Gulf/Presidential Range were 5.87 and 15.40 dv for the 20% clearest and most impaired days, respectively. When comparing these levels to the current 2015-2019 levels for GRGU shown in Table 5-1 below, this represents a change (improvement) of 1.18 and 3.07 dv for the clearest and most impaired days, respectively, since the time of New Hampshire’s most recent progress report.

Table 5-1: Baseline, Current and Reasonable Progress Goal Haze Index Levels for Federal Class I Areas In or Adjacent to the MANE-VU Region

Federal Class I Area	IMPROVE SITE DATA CODE(S)	State	CLEAREST DAYS			MOST IMPAIRED DAYS				
			Baseline (2000-04) (dv)	Current (2015-19) (dv)	RPG (2028) (dv)	Baseline (2000-04) (dv)	Current (2015-19) (dv)	URP 2028 (dv/yr)	URP 2028 (dv)	RPG (2028) (dv)
Acadia National Park	ACAD	ME	8.78	6.36	6.33[b] 6.33[c]	22.01	14.24	0.194	17.36	13.35[b] 13.44[c]
Moosehorn Wilderness Area Roosevelt Campobello International Park	MOOS	ME NB	9.16	6.48	6.45[b] 6.46[c]	20.65	12.99	0.178	16.38	13.12[b] 13.20[c]
Great Gulf Wilderness Area Presidential Range/Dry River Wilderness Area	GRGU	NH	7.65	4.69	5.06[b] 5.11[c]	21.88	12.33	0.202	17.04	12.00[b] 12.13[c]
Lye Brook Wilderness Area	LYBR_ LYEB	VT	6.37	4.88	3.86[b] 3.90[c]	23.57	14.06	0.222	18.23	13.68[b] 13.89[c]
Brigantine Wilderness Area	BRIG	NJ	14.33	10.81	10.47[b] 10.55[c]	27.43	18.53	0.279	20.74	17.97[b] 18.16[c]
Dolly Sods Wilderness Area† Otter Creek Wilderness Area†	DOSO	WV	12.28	6.18	7.27[b] 7.33[c]	28.29	17.03	0.323	20.54	15.09[b] 15.30[c]
James River Face Area[a]	JARI	VA	14.21	8.99	9.36[b] 9.45[c]	28.08	17.28	0.315	20.83	15.31[b] 15.48[c]
Shenandoah National Park[a]	SHEN	VA	10.93	6.54	6.83[b] 7.00[c]	28.32	16.38	0.313	20.80	14.25[b] 14.54[c]

[a] *Federal Class I area adjacent to the MANE-VU region*
[b] *Modeled Reasonable Progress Goal with MANE-VU "Ask" Measures (Appendix U, Table 12-8)*
[c] *Modeled Reasonable Progress Goal without MANE-VU "Ask" Measures (Appendix U, Table 12-8)*

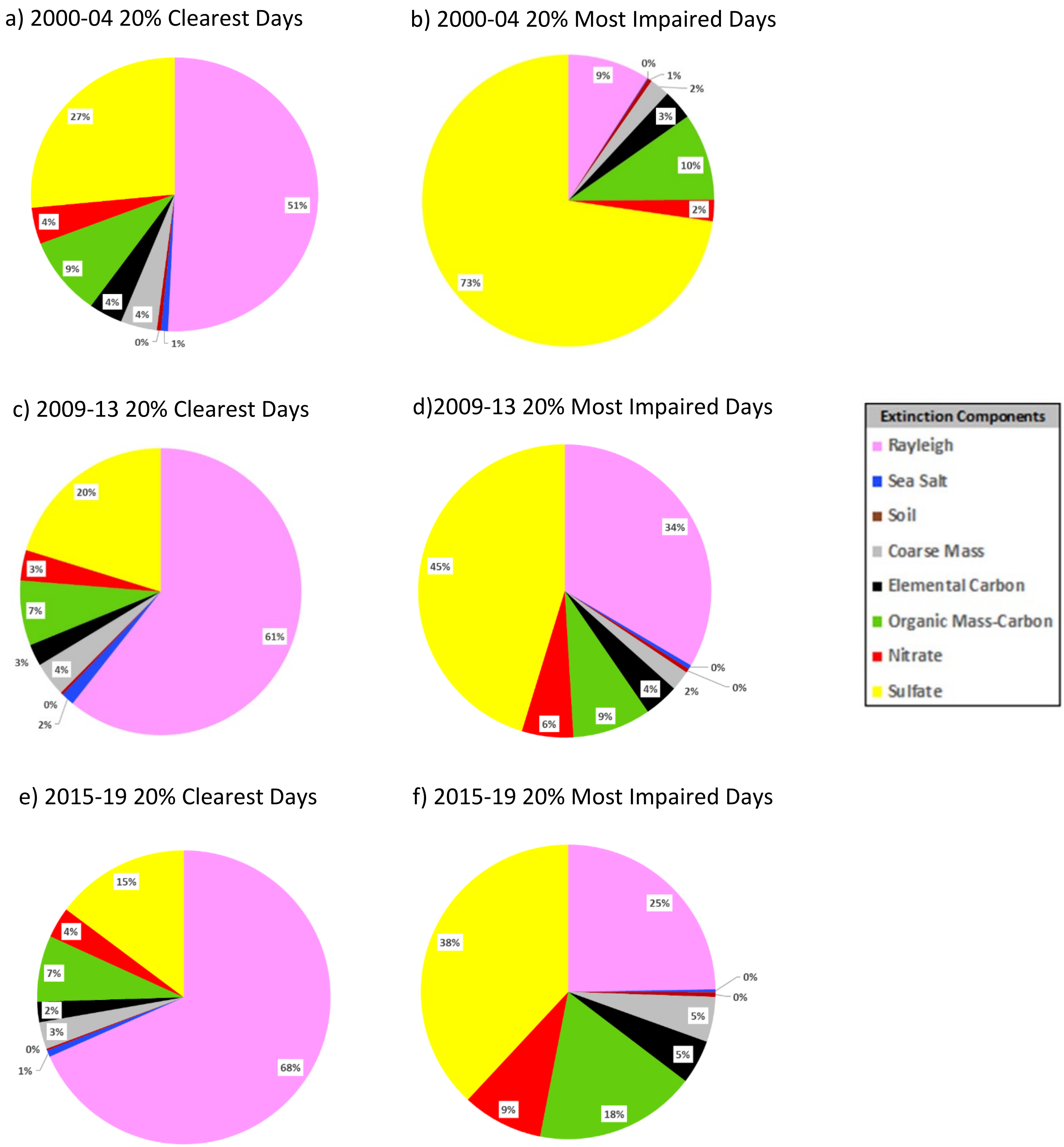
Figure 5-2: Visibility Metrics Levels at Great Gulf/Presidential-Dry River Wilderness Areas [77]



Analyses of visibility by species help policy decision makers determine what control strategies to consider for the second regional haze implementation planning period. The plots shown in Figure 5-3 below contain species average percent contributions for both 20% clearest and 20% most impaired days for baseline, interim and current 5-year periods. Results clearly show a significant reduction in sulfate contributions to New Hampshire's Federal Class I areas for the 20% most impaired days with varying levels of increases, or no change, for other species. The percent contribution from nitrates has, similar to other Federal Class I areas examined for this report, increased, here from 3% to 9%.

[77] MANE-VU, (January 2020 revision). *Mid-Atlantic/Northeast U.S. Visibility Data 2004-2019 (2nd RH SIP Metrics)*, Appendix B.

Figure 5-3: Great Gulf/Presidential-Dry River Wilderness Areas Species Percent Contribution to Baseline (2000-04), Interim (2009-2013), and Current (2015-19) Haze Index Levels



5.4 Analysis of Change in Emissions of Pollutants Contributing to Visibility Impairment

5.4.1 Introduction

This section is intended to satisfy paragraph 40 CFR §51.308(g)(4) of the Regional Haze Program Requirements. §51.308(g)(4) requires:

> "An analysis tracking the change over the period since the period addressed in the most recent plan[78] required under paragraph (f) of this section in emissions of pollutants contributing to visibility impairment[79] from all sources and activities within the State. Emissions changes should be identified by type of source or activity. With respect to all sources and activities, the analysis must extend at least through the most recent year for which the state has submitted emission inventory information to the Administrator in compliance with the triennial reporting requirements of subpart A of this part as of a date 6 months preceding the required date of the progress report… The State is not required to backcast previously reported emissions to be consistent with more recent emissions estimation procedures, and may draw attention to actual or possible inconsistencies created by changes in estimation procedures."

To this end, New Hampshire has provided a summary of emissions of visibility impairing pollutants from all sources and activities within the State for the period from 2002 to 2017. 2017 is the most recent year for which New Hampshire has submitted emissions estimates to fulfill the requirements of 40 CFR §51 Subpart A – Air Emissions Reporting Requirements. In this summary, New Hampshire has provided estimates for NO_X, course particulate matter (PM_{10}), $PM_{2.5}$, SO_2, VOC, and ammonia (NH_3), all of which have the potential to contribute to regional haze formation. The data were obtained from EPA's NEI.[80] Data categories include point sources, nonpoint sources, nonroad mobile sources, and on-road mobile sources. A brief description of each of these categories is provided below:

- **NEI Point sources** are discrete facilities that generally report their emissions directly via state and/or Federal permitting and reporting programs. Point sources usually represent larger facilities such as EGUs, factories, and heating plants for large schools and universities. In the tables and charts that follow, point source NO_X and SO_2 are further broken down into AMPD sources and non-AMPD sources. The majority of sources that report to one or more of EPA's AMPD programs are EGUs. Therefore, the AMPD point category is a reasonable representation of emissions from EGUs.
- **NEI Nonpoint sources** are those emissions categories that are too small, widespread, or numerous to be inventoried individually. Therefore, emissions are estimated for these categories using aggregate activity data such as population, employment, and statewide fuel use (after accounting for the fuel used by point sources). There is a wide range of nonpoint categories, but examples include residential fuel combustion and commercial & consumer solvent use. As of

[78] Plan means an implementation plan approved or promulgated under section 110 of 172 of the Act.

[79] Visibility impairment or anthropogenic visibility impairment means any humanly perceptible difference due to air pollution from anthropogenic sources between actual visibility and natural visibility on one or more days. Because natural visibility can only be estimated or inferred, visibility impairment also is estimated or inferred rather than directly measured.

[80] EPA Emissions Inventory System (EIS) Gateway. Available at: https://www.epa.gov/air-emissions-inventories/emissions-inventory-system-eis-gateway.

2008, the EPA includes emissions from the mobile source nonroad categories for commercial marine vessels and underway rail emissions in the nonpoint NEI. Prior to 2011, EPA included vehicle refueling at gasoline service stations in the area sector and beginning with 2011 it was included in the onroad sector.

- **NEI Nonroad mobile sources** represent vehicles and equipment that are not designed to operate on roadways. Examples include aircraft, ships, locomotives, construction equipment, recreational vehicles, and lawn & garden equipment (note, however, that emissions from airports and some large rail yards are inventoried as point sources since these emissions occur at discrete locations). As discussed above, beginning in 2008 the NEI emissions from airports and railroad switchyards are inventoried as point sources and emissions from other railroad activities and commercial marine vessels are inventoried as nonpoint sources.
- **NEI On-road mobile sources** represent vehicles that operate on roadways, including cars, trucks, buses, and motorcycles. Emissions were calculated with the EPA Motor Vehicle Emissions Simulator model (MOVES) in 2007, 2011 and 2017, which was different from the model used for the 2002 inventory (MOBILE6). As of 2011, NEI v2, EPA includes vehicle refueling at gasoline service stations in the onroad sector instead of the area or nonpoint sector.

The summary data were taken from EPA's NEI. Under the Air Emissions Reporting Requirements (AERR), states are required to submit estimates for all emissions categories to EPA on a three-year cycle. The state submittals are combined with EPA's own estimates to form the NEI. Note that 2005 was a limited effort NEI, so that year is not shown. A brief discussion of the trends in emissions, based on the EPA NEI grouping, is provided in the section for each pollutant. Inconsistencies due to changes in estimation procedures and grouping are also pointed out, where applicable.

40 CFR §51.308(g)(4) also states, "With respect to sources that report directly to a centralized emissions data system operated by the Administrator, the analysis must extend through the most recent year for which the Administrator has provided a State-level summary of such reported data or an internet-based tool by which the State may obtain such a summary as of a date 6 months preceding the required date of the progress report." Therefore, New Hampshire has also provided a summary of NO_X and SO_2 emissions for AMPD sources for the years 2016 through 2019.

In addition to the New Hampshire-specific data, 2002 – 2017 summaries of emissions from all sectors, as well as summaries of 2016 through 2019 NO_X and SO_2 emissions for AMPD sources are provided for all the MANE-VU states, including CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, and VT. Similar summaries are also shown for the states listed in the MANE-VU "Inter-RPO Ask"[81] as having the potential to contribute to visibility impairment in MANE-VU Class I areas. These states include AL, FL, IL, IN, KY, LA, MI, MO, NC, OH, TN, TX, VA, and WV. This group of states is referred to hereinafter as the "Ask states."

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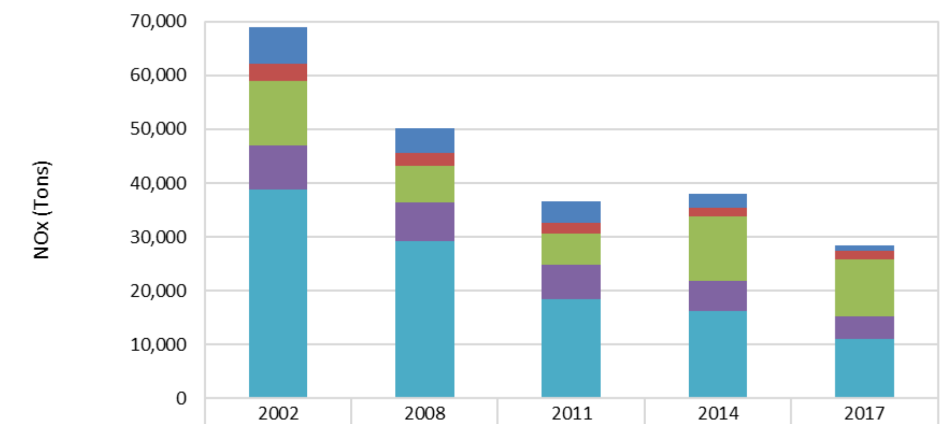
[81] MANE-VU, (August 2017). *Statement of the Mid-Atlantic/Northeast Visibility Union (MANE-VU) States Concerning a Course of Action in Contributing States Located Upwind of MANE-VU Toward Assuring Reasonable Progress for the Second Regional Haze Implementation Period (2018-2028)*. Appendix O.

5.4.2 Nitrogen Oxides

Figure 5-4 shows a summary of NO_X emissions from all data categories – point, nonpoint, non-road, and on-road – for the period from 2002 to 2017 in New Hampshire.

Figure 5-4: NOx Emissions in New Hampshire for all Data Categories, 2002 – 2017 (tpy)



	2002	2008	2011	2014	2017
AMPD Point	6,873	4,650	3,951	2,753	1,070
Non-AMPD Point	3,104	2,319	1,936	1,590	1,621
Nonpoint	12,117	6,874	5,758	11,894	10,544
Nonroad	8,142	7,116	6,532	5,565	4,262
Onroad	38,799	29,308	18,388	16,292	11,036

NO_X emissions have shown a steady decline in New Hampshire over the period from 2002 to 2017, particularly in the non-road and on-road mobile sectors. Reductions in non-road emissions are due to a wide range of Federal rules to reduce emissions from non-road vehicles and equipment. A few examples of regulatory programs that have reduced, and/or will continue to reduce, emissions from non-road vehicles and equipment include: 40 CFR Parts 9, 69, et al. *Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel*, 40 CFR Parts 9, 85, et al. *Control of Emissions of Air Pollution From Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder*, and 40 CFR Parts 9, 60, 80 et al. *Control of Emissions From Nonroad Spark-Ignition Engines and Equipment*. On-road mobile emissions reductions are due in part to Federal requirements for on-road vehicles such as the Tier 2 motor vehicle emissions standards. Federal requirements for on-road mobile sources and fuels are being strengthened even further with the Tier 3 requirements. More information on programs to control emissions from mobile sources can be found on EPA's Transportation, Air Pollution, and Climate Change website[82]. For both non-road and on-road mobile sources, NO_X emissions are expected to continue to decrease as fleets turn over and older more polluting vehicles and equipment are replaced by newer, cleaner ones.

It should be noted that the increase in nonpoint NO_X between 2011 and 2014 is artificial. For the 2011 and previous inventories, New Hampshire estimated and reported industrial and commercial distillate oil combustion emissions under a composite source classification code for boilers and internal combustion (IC) engines using a single emission factor for boilers. However, there has been a recent focus on NO_X emissions from IC engines. Therefore, for the 2014 inventory, New Hampshire estimated

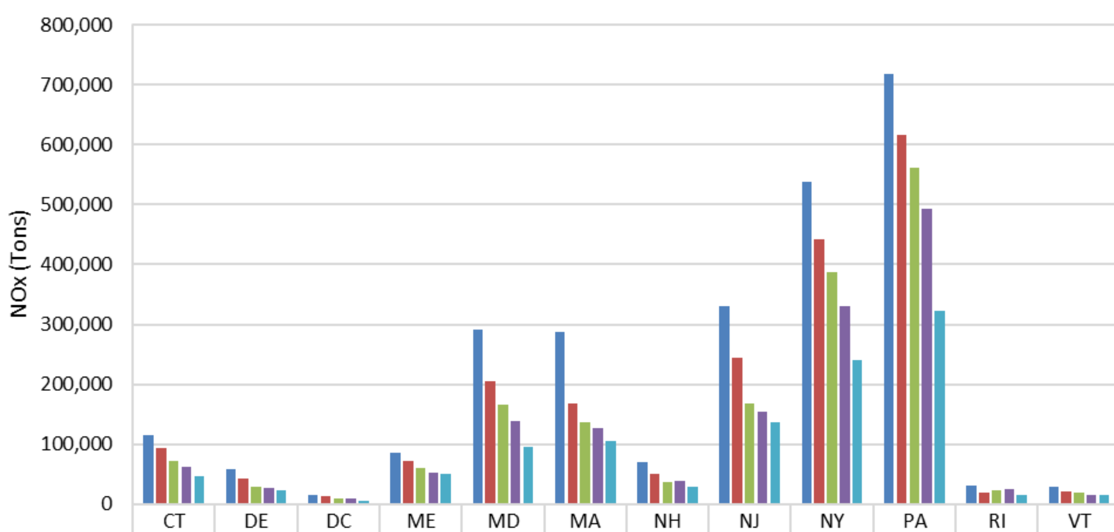
82 EPA Transportation, Air Pollution, and Climate Change. Available at: https://www.epa.gov/transportation-air-pollution-and-climate-change.

and reported nonpoint industrial and commercial distillate oil emissions for boilers and IC engines separately using specific emission factors for boilers and IC engines. Since the NO_X emission factor for IC engines is significantly higher than that for boilers, it created the artificial increase that can be seen for nonpoint NO_X emissions in New Hampshire when comparing 2014 to previous inventories. In addition, because of a revised point source subtraction methodology, the sharp decrease in nonpoint NO_X between 2002 and 2008/2011 is also artificial.

Sources of NO_X emissions in New Hampshire that report to the EPA's AMPD showed a decline in emissions from 2016 to 2019 (1,326 tons in 2016 and 1,018 tons in 2019). These are compared to the AMPD reporting sources in the MANE-VU states in Figure 5-4. AMPD NO_X emissions have also declined relative to the 2002 to 2017 data shown in Figure 5-1.

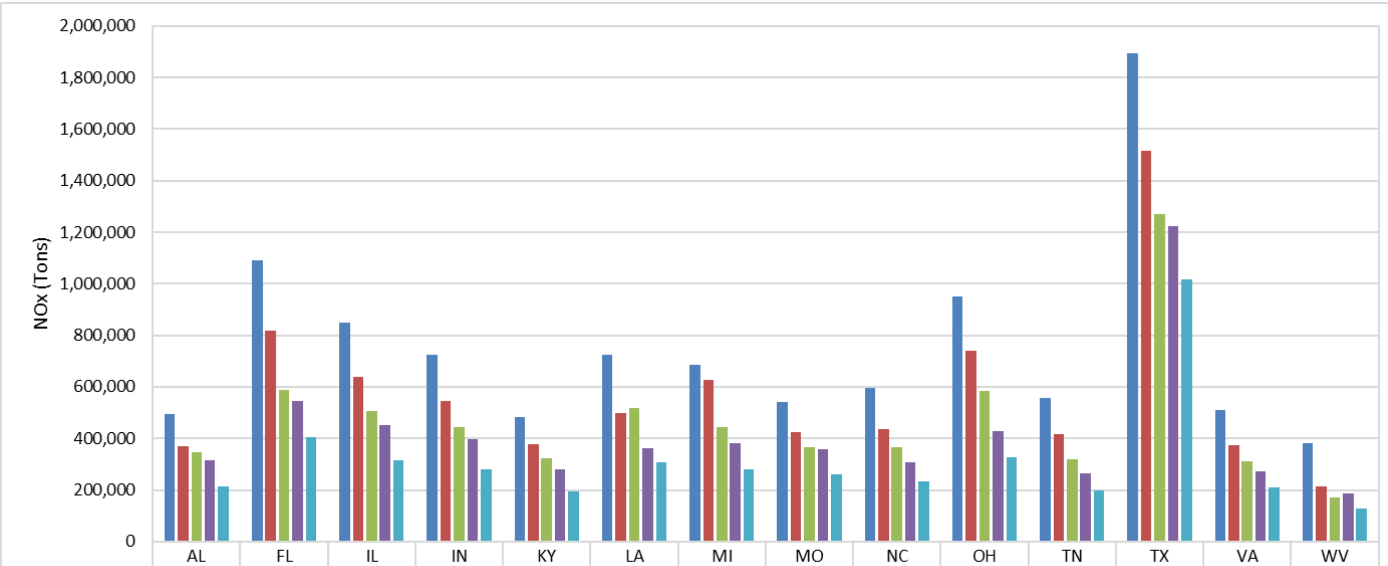
Similar to New Hampshire, Figures 5-5 and 5-6 show a steady decline in NO_X emissions from 2002 to 2017 for almost all of the MANE-VU states and the "Ask states" (average of 57% and 58%, respectively). Much of this decline in NO_X emissions is due to the Federal control programs for non-road and on-road mobile sources described earlier. Other sources of NO_X emissions reductions include individual states' rules for NO_X RACT.

Figure 5-5: Total NOx Emissions in the MANE-VU States from all Data Categories, 2002 – 2017 (tpy)



	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT
2002	115,012	57,345	15,169	85,995	291,299	287,077	69,036	330,369	537,513	718,261	29,917	28,764
2008	93,080	42,790	13,189	71,606	205,239	168,599	50,267	244,552	442,093	616,320	18,963	20,903
2011	72,828	29,436	9,403	59,785	165,185	136,892	36,566	168,297	387,262	561,928	22,489	19,635
2014	63,003	27,684	8,566	52,346	138,496	127,304	38,093	154,655	330,782	492,755	24,716	15,697
2017	46,575	22,882	4,780	49,890	96,310	105,860	28,533	136,961	240,411	321,900	14,865	15,311

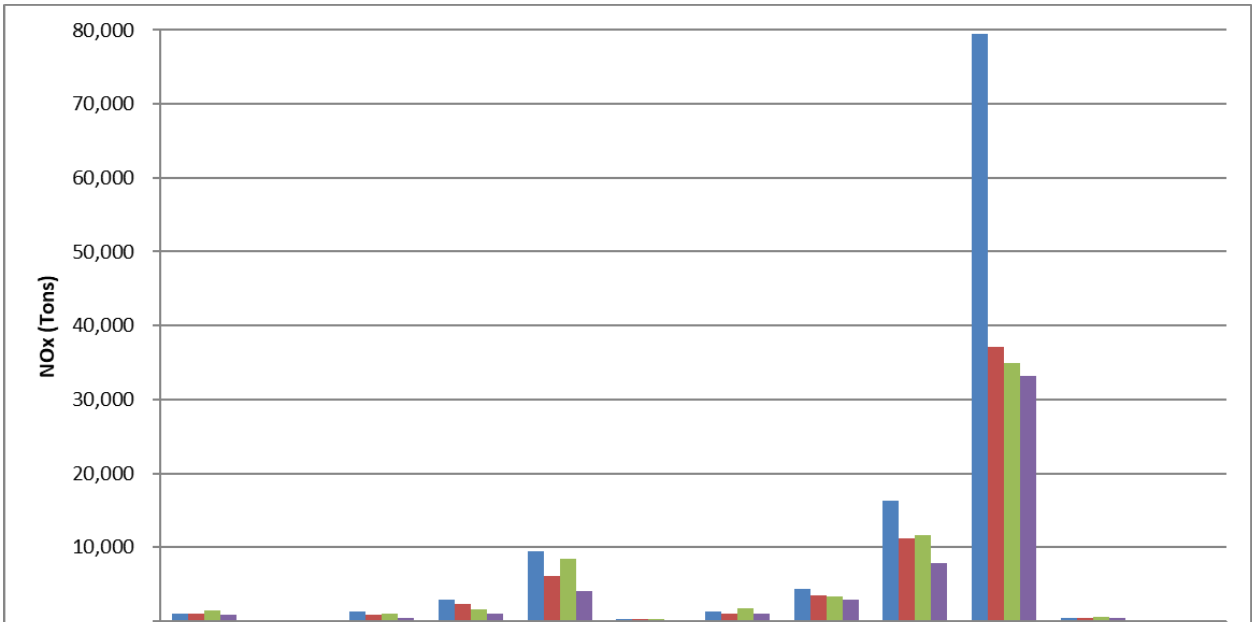
Figure 5-6: Total NOx Emissions in the "Ask States" from all Data Categories, 2002 – 2017 (tpy)



	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2002	494,699	1,092,044	847,488	723,294	484,708	723,164	684,627	542,019	596,536	948,927	557,649	1,894,041	511,048	381,774
2008	369,943	818,294	638,926	545,953	378,216	496,880	628,254	425,645	434,596	740,029	416,702	1,515,796	373,229	213,495
2011	345,285	587,170	507,075	443,116	324,803	519,018	444,088	365,593	366,131	583,802	320,085	1,268,310	310,821	171,715
2014	314,187	544,176	453,108	395,719	281,468	361,543	382,946	357,946	305,674	429,038	265,631	1,225,152	273,733	184,782
2017	213,135	406,291	317,164	280,409	196,104	306,028	279,503	259,367	231,534	328,246	199,380	1,017,177	209,669	126,645

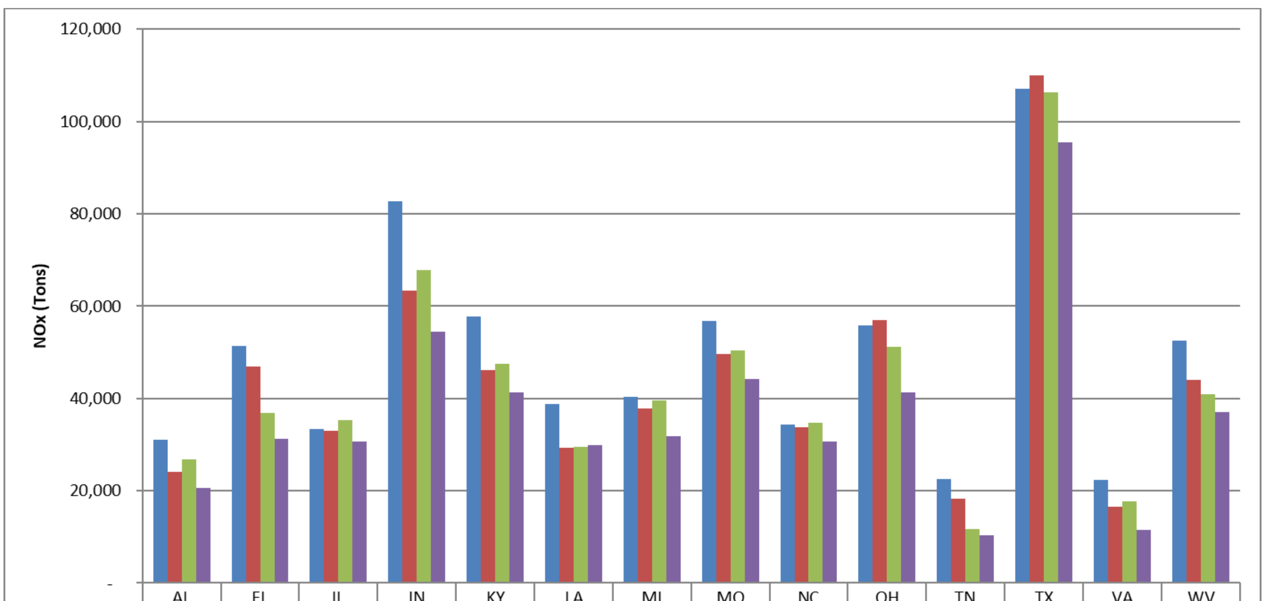
AMPD NO_X data for 2016 through 2019 from the MANE-VU states and for the "Ask states" is shown below in Figures 5-7 and 5-8, and indicates decreases in NO_X emissions in both groups of states. For applicable states, some of the reduction in AMPD NO_X since 2002 is attributable to the NOx Budget Trading Program under the NO_X SIP Call and the Clean Air Interstate Rule or CAIR,(replaced by the Cross-State Air Pollution Rule or CSAPR). Other reductions are attributable to source retirements and fuel switching due to the availability of less expensive natural gas in recent years.

Figure 5-7: MANE-VU State NOx Emissions from AMPD, 2016–2019 (tpy)



	CT	DC	DE	MA	MD	ME	NH	NJ	NY	PA	RI	VT
2016	1,058	68	1,308	2,883	9,395	288	1,326	4,382	16,222	79,450	448	167
2017	1,052	67	889	2,372	6,112	263	1,070	3,443	11,253	37,148	470	139
2018	1,492	96	948	1,646	8,431	327	1,695	3,408	11,702	34,928	513	142
2019	801	76	496	1,007	4,019	138	1,018	2,949	7,844	33,132	453	133

Figure 5-8: "Ask States" NOx Emissions from AMPD Sources, 2016–2019 (tpy)

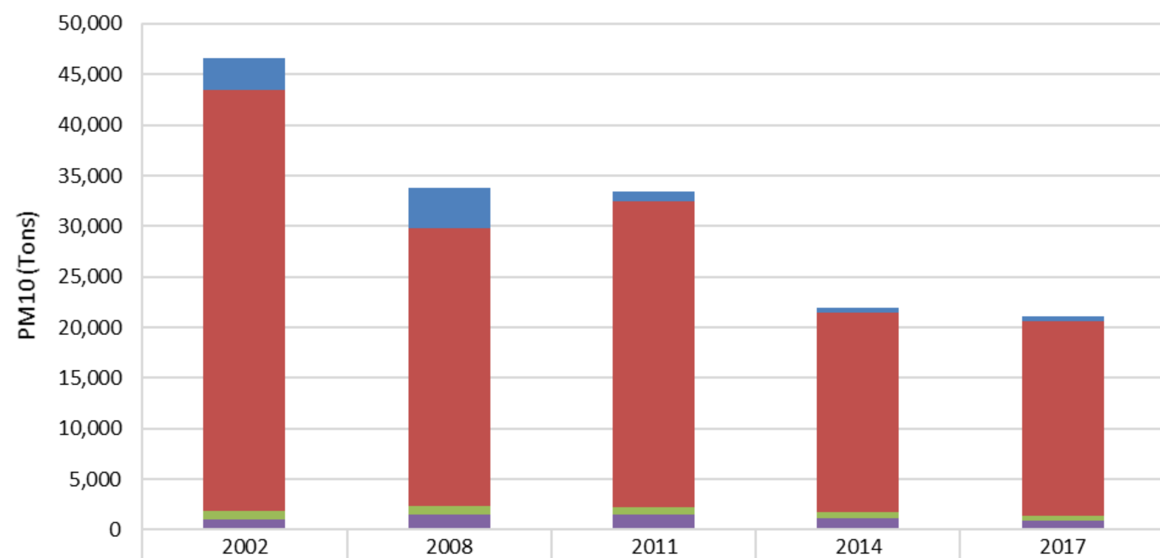


	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2016	31,127	51,442	33,298	82,615	57,764	38,836	40,366	56,692	34,287	55,756	22,610	107,158	22,280	52,584
2017	24,085	46,907	33,066	63,421	46,053	29,249	37,739	49,692	33,761	57,039	18,201	109,914	16,545	44,079
2018	26,728	36,875	35,310	67,776	47,503	29,575	39,550	50,393	34,663	51,172	11,629	106,258	17,740	40,925
2019	20,571	31,251	30,655	54,464	41,341	29,848	31,741	44,165	30,748	41,349	10,263	95,562	11,506	37,012

5.4.3 Particulate Matter Less Than 10 Microns

Figure 5-9 shows a summary of PM_{10} emissions from all data categories – point, nonpoint, non-road, and on-road – for the period from 2002 to 2017 in New Hampshire. Generally, PM_{10} emissions have remained constant in New Hampshire, particularly between 2008 and 2011 and then between 2014 and 2017. It should be noted that the sharp decrease in point source PM_{10} emissions between the 2002/2008 inventories and the 2011/2017 inventories is impacted by the fact that a large point source in New Hampshire mistakenly reported its PM_{10} emissions in pounds instead of tons. This error was corrected for the 2011 inventory and beyond.

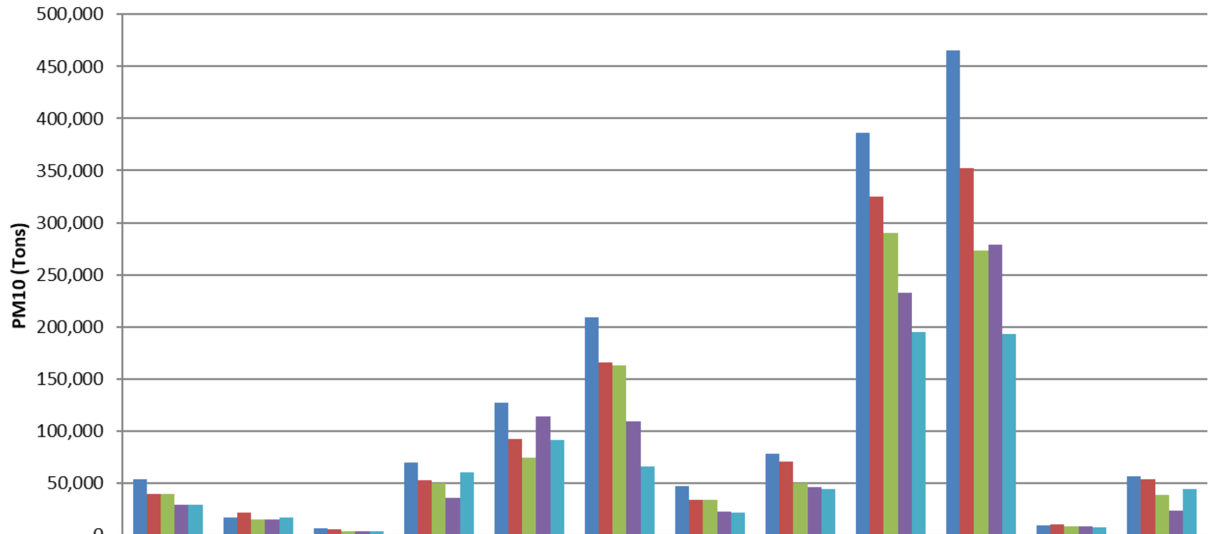
Figure 5-9: PM_{10} Emissions in New Hampshire for all Data Categories, 2002 – 2017 (tpy)



	2002	2008	2011	2014	2017
Point	3,140	4,039	896	476	510
Nonpoint	41,501	27,452	30,253	19,732	19,242
Nonroad	942	840	762	672	511
Onroad	969	1,484	1,468	1,105	879

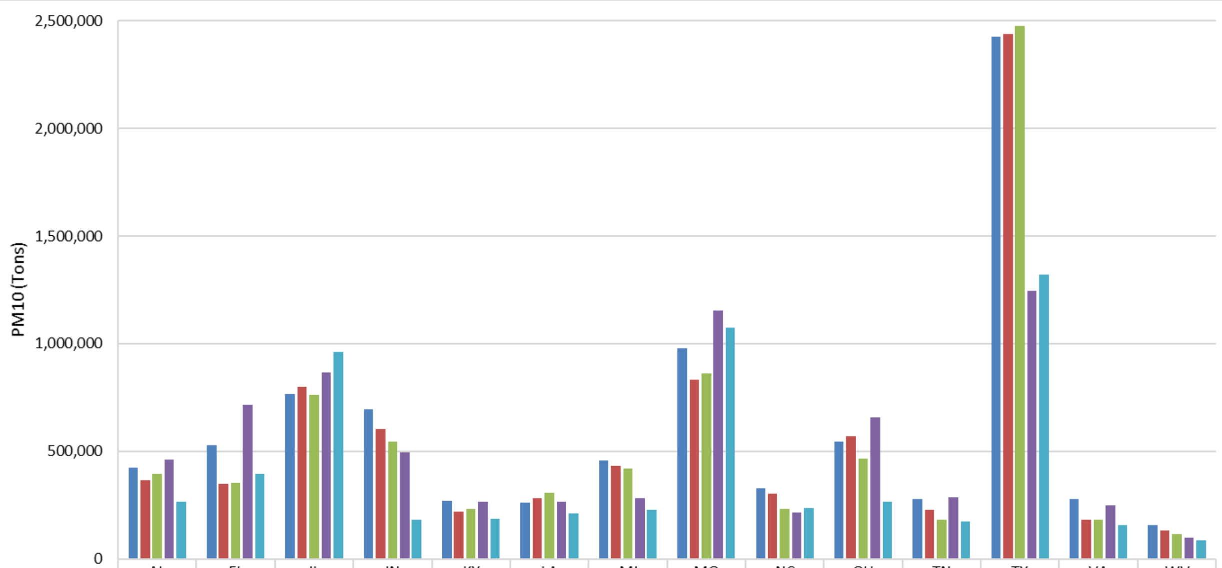
Figure 5-10 shows total PM_{10} emissions from all data categories in the MANE-VU states, Figure 5-11 from the "Ask states." PM_{10} emissions in some of the MANE-VU and "Ask states" show no particular pattern over the 2002 to 2017 period. Some of the large declines in PM_{10} emissions from 2002 to subsequent years, as well as some of the increases in 2014, could be due to changes in estimation methodologies for categories such as yard waste burning, paved and unpaved road dust, and residential wood combustion.

Figure 5-10: Total PM_{10} Emissions in the MANE-VU States from all Data Categories, 2002 – 2017 (tpy)



	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT
2002	53,267	17,165	6,839	69,543	126,986	209,076	46,551	77,723	386,381	465,435	9,103	55,937
2008	39,048	21,544	5,211	52,311	92,156	165,801	33,814	70,431	325,041	352,392	10,267	53,130
2011	39,097	15,071	3,410	49,526	74,522	162,952	33,379	49,742	290,566	273,067	8,387	38,373
2014	28,842	14,896	3,865	35,606	114,097	109,218	21,985	45,946	232,441	278,725	8,400	23,422
2017	29,058	17,213	3,771	60,347	91,366	65,922	21,142	44,487	195,140	193,114	7,148	43,618

Figure 5-11: Total PM_{10} Emissions in the “Ask States” from all Data Categories, 2002 – 2017 (tpy)

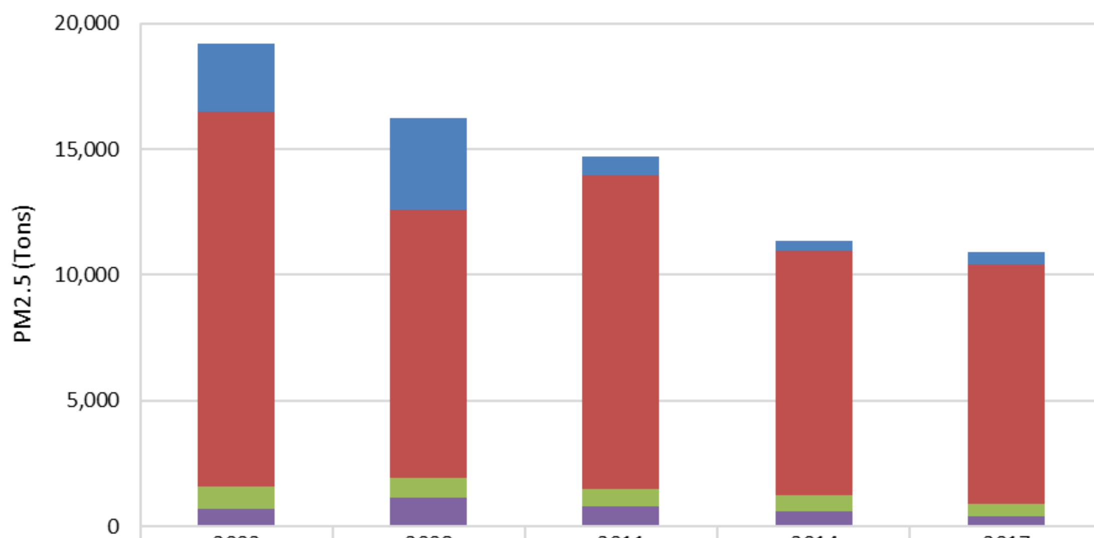


	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2002	425,221	527,753	764,273	696,591	270,051	259,793	455,348	977,691	327,059	544,239	278,733	2,424,752	277,684	156,682
2008	363,195	348,091	797,788	602,105	219,956	281,998	431,311	831,795	300,866	568,210	227,616	2,440,498	179,593	133,479
2011	393,530	351,483	762,584	544,131	232,735	307,928	418,847	861,980	230,453	467,023	182,467	2,478,052	179,646	115,661
2014	460,695	713,703	863,923	495,961	265,370	263,360	282,519	1,153,343	213,800	655,947	286,276	1,245,310	249,306	99,561
2017	264,039	394,521	961,665	182,138	184,276	211,710	226,978	1,075,415	235,638	265,620	174,588	1,320,222	156,187	83,681

5.4.4 Particulate Matter Less Than 2.5 Microns

Figure 5-12 shows a summary of $PM_{2.5}$ emissions from all data categories for the period from 2002 to 2017 in New Hampshire. Similar to PM_{10}, $PM_{2.5}$ emissions have remained constant in New Hampshire, particularly between 2008 and 2011 and between 2014 and 2017. As with PM_{10}, it should be noted that the sharp decrease in point source $PM_{2.5}$ emissions between the 2002/2008 inventories and the 2011/2017 inventories is artificial. For the 2008 and earlier inventories, a large point source in New Hampshire mistakenly reported its $PM_{2.5}$ emissions in units of pounds rather than tons.

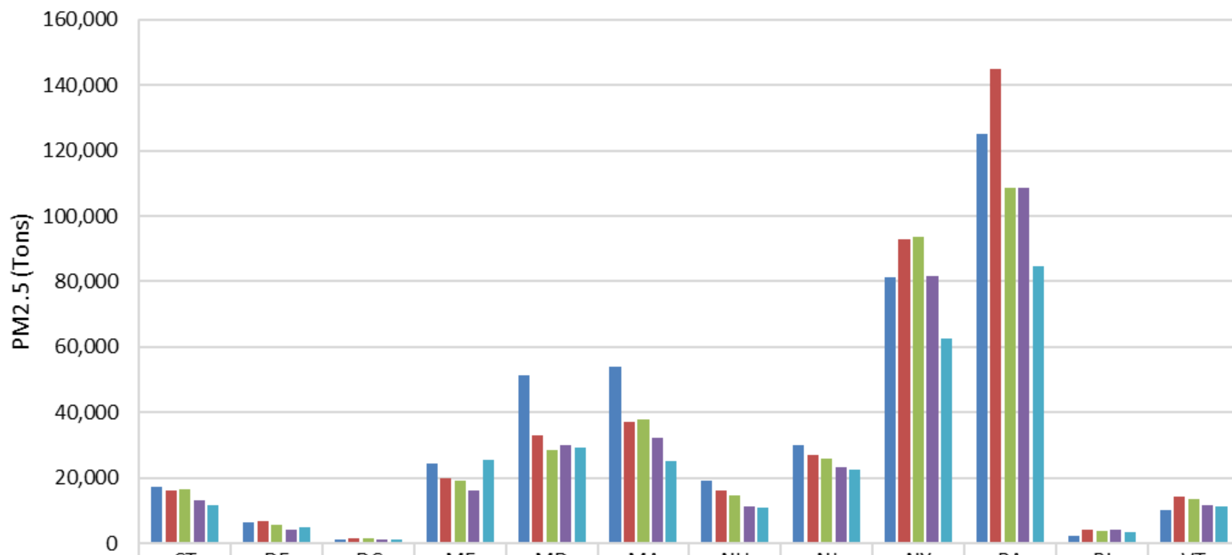
Figure 5-12: $PM_{2.5}$ Emissions in New Hampshire from all Data Categories (tpy)



	2002	2008	2011	2014	2017
Point	2,733	3,685	737	421	485
Nonpoint	14,869	10,636	12,471	9,709	9,546
Nonroad	891	791	718	632	480
Onroad	714	1,145	784	596	410

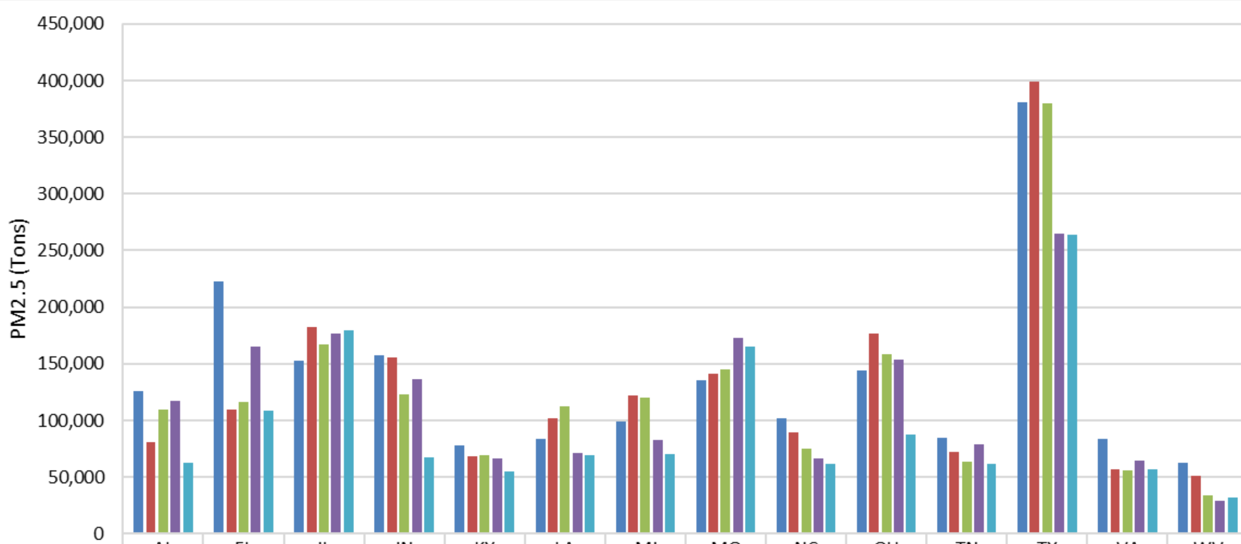
Figures 5-13 and 5-14 below show total $PM_{2.5}$ emissions from all data categories in the MANE-VU and "Ask states." These emissions show no particular pattern over the 2002 to 2017 period. In some states, emissions have declined or remained constant; in others, there are increases. As with PM_{10}, some of the large declines in $PM_{2.5}$ emissions from 2002 to subsequent years, as well as some of the increases in 2014, could be due to changes in estimation methodologies for categories such as yard waste burning, paved and unpaved road dust, and residential wood combustion.

Figure 5-13: Total $PM_{2.5}$ Emissions in the MANE-VU States from all Data Categories, 2002 – 2017 (tpy)



	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT
2002	17,183	6,288	1,343	24,515	51,465	54,140	19,207	29,976	81,427	124,964	2,433	10,167
2008	16,190	6,838	1,694	19,930	32,947	36,965	16,257	26,966	93,027	145,016	4,163	14,280
2011	16,545	5,549	1,361	19,045	28,499	37,770	14,710	25,785	93,611	108,748	3,949	13,351
2014	13,088	4,174	1,263	16,270	29,848	32,192	11,358	23,197	81,699	108,665	4,310	11,593
2017	11,723	4,761	1,047	25,681	29,063	25,209	10,921	22,427	62,387	84,590	3,441	11,283

Figure 5-14: Total $PM_{2.5}$ Emissions in the "Ask States" from all Data Categories, 2002 – 2017 (tpy)

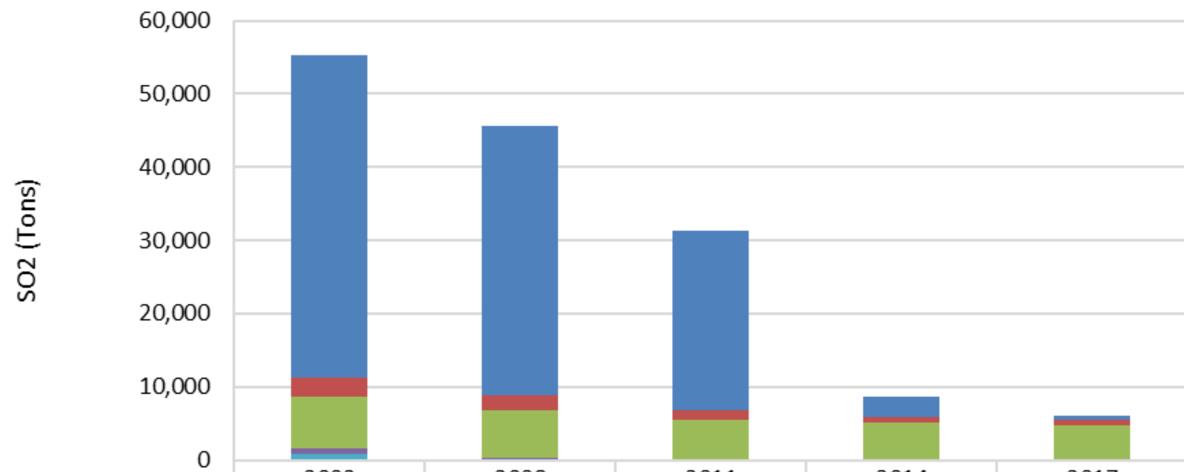


	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2002	125,441	222,204	152,316	157,078	77,952	83,989	98,713	135,832	101,965	143,671	84,176	381,212	83,567	62,269
2008	80,622	109,965	182,344	155,982	68,484	101,593	121,710	140,955	89,613	176,599	72,333	399,176	57,083	50,936
2011	109,345	116,396	166,699	123,193	69,665	112,415	120,121	145,230	74,844	157,995	63,949	379,886	56,157	33,712
2014	117,272	165,534	176,836	136,613	66,812	70,884	82,780	173,260	66,023	153,291	79,020	264,976	64,340	28,929
2017	62,827	108,248	179,631	67,517	54,566	69,341	69,910	165,196	61,622	87,459	61,772	263,523	56,912	31,913

5.4.5 Sulfur Dioxide

Figure 5-15 shows SO_2 emissions in New Hampshire for all data categories for the period from 2002 to 2017. As shown, there is a marked decrease in AMPD SO_2 emissions for 2014 compared to 2011 and earlier years. This is due to the installation of a scrubber at Granite Shore Power (formerly Eversource Energy) Merrimack Station, a large EGU in New Hampshire. This scrubber became operational at the end of 2011. SO_2 emissions from AMPD sources in New Hampshire also declined between 2014 and 2017.

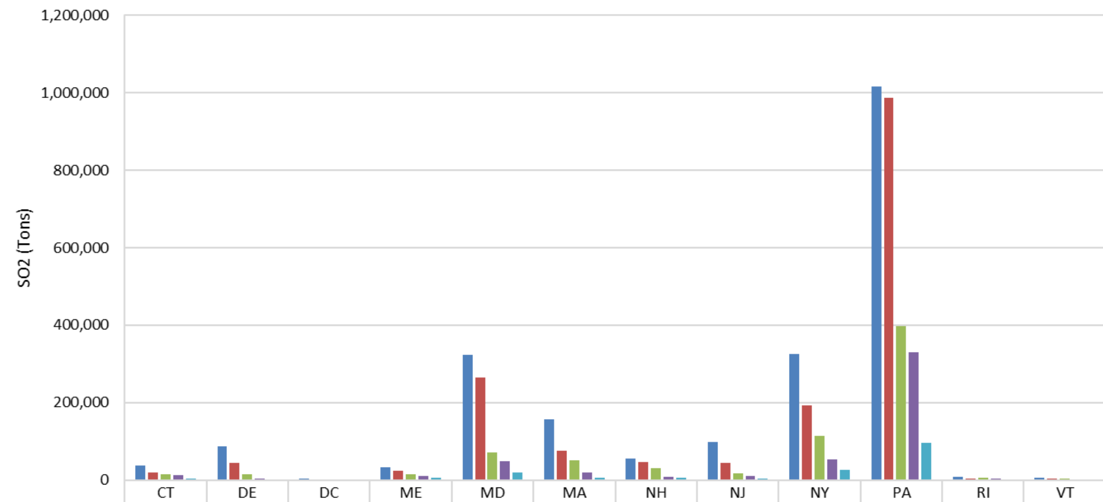
Figure 5-15: SO_2 Emissions in New Hampshire from all Data Categories, 2002 – 2017 (tpy)



	2002	2008	2011	2014	2017
AMPD Point	43,947	36,895	24,445	2,636	473
Non-AMPD Point	2,651	2,045	1,299	816	727
Nonpoint	7,085	6,460	5,369	4,951	4,628
Nonroad	683	119	20	16	11
Onroad	880	146	124	134	133

Figure 5-16 shows total SO_2 emissions from all data categories in the MANE-VU states for 2002 to 2017. A steady decrease in SO_2 emissions can be seen for each MANE-VU state over this period. Some of these decreases are attributable to the ultra-low sulfur fuel oil strategy and the 90% or greater reduction in SO_2 emissions at 167 EGU stacks (both inside and outside of MANE-VU) requested in the MANE-VU "Ask" for states within MANE-VU for the first regional haze planning period. Since some components of the MANE-VU ultra-low sulfur fuel oil strategy have milestones of 2014, 2016 and 2018, and as MANE-VU states continue to adopt rules to implement the strategy, SO_2 emissions reductions are expected to continue well beyond the 2002 to 2017 timeframe shown in Figure 5-16. Other SO_2 emissions decreases are due to source shutdowns and fuel switching due to the availability of less expensive natural gas in recent years.

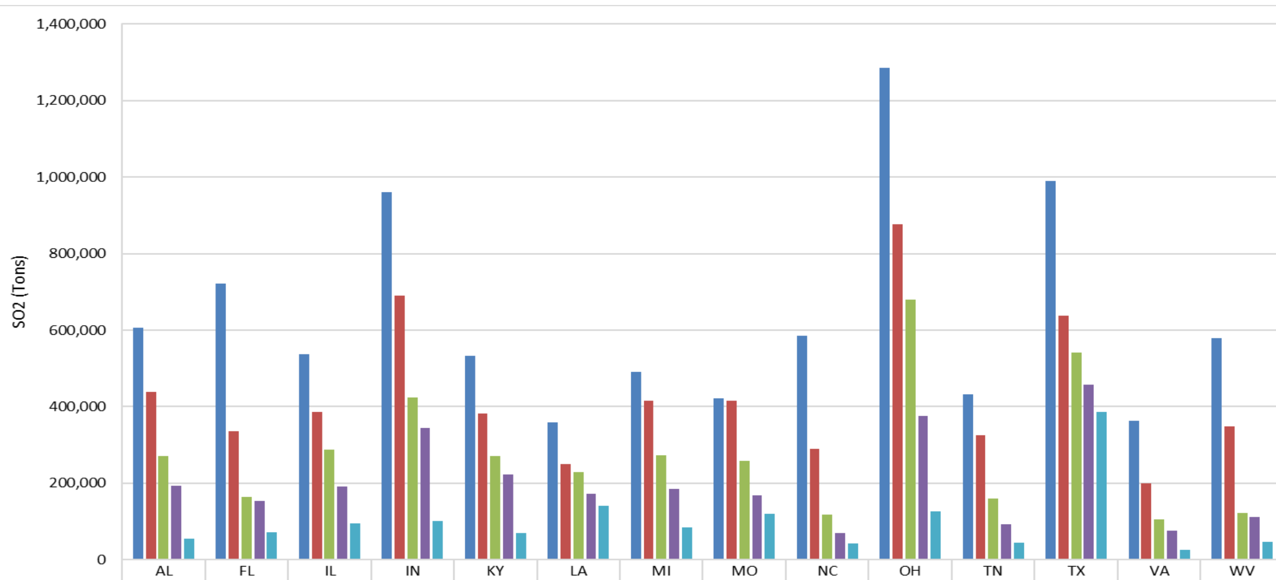
Figure 5-16: Total SO_2 Emissions in the MANE-VU States for all Data Categories, 2002 – 2017 (tpy)



	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT
2002	38,102	86,999	4,051	33,585	324,015	156,778	55,246	96,967	326,448	1,015,732	8,158	4,988
2008	19,443	44,282	1,273	23,362	264,487	76,256	45,666	44,370	193,703	987,671	4,345	4,044
2011	15,334	13,883	1,829	15,528	71,751	51,338	31,257	17,907	114,940	398,497	4,689	3,445
2014	12,445	4,330	252	11,242	48,490	18,890	8,554	9,781	52,857	329,804	3,406	1,503
2017	2,692	1,448	90	5,762	20,130	6,256	5,972	4,483	25,988	96,263	816	743

Figure 5-17 shows total SO_2 emissions from all data categories in the “Ask states” for 2002 to 2017. Similar to the MANE-VU states, decreases in SO_2 can be seen for all the “Ask states” over this period. Some of these decreases are attributable to the control measures requested in the MANE-VU “Ask” for states outside of MANE-VU for the first regional haze planning period, including timely implementation of BART requirements and a 90% or greater reduction in SO_2 emissions at 167 stacks inside and outside of MANE-VU.

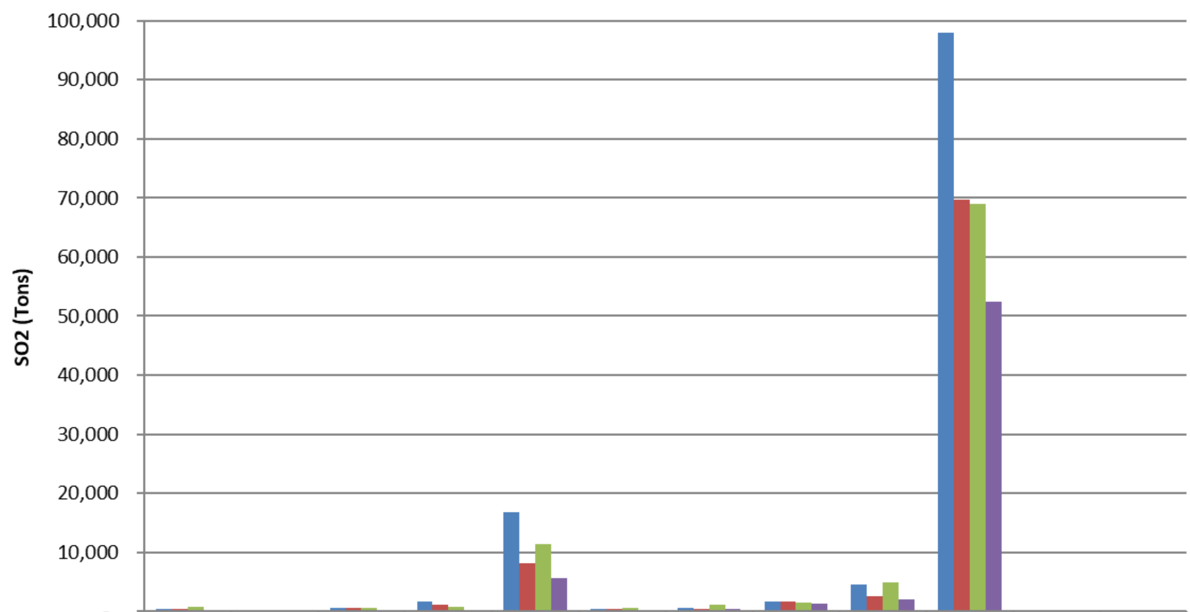
Figure 5-17: Total SO_2 Emissions in the “Ask States” for all Data Categories, 2002 – 2017 (tpy)



	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2002	606,778	721,898	536,620	960,539	533,614	359,641	490,487	421,708	585,453	1,286,023	432,890	989,242	362,478	580,073
2008	438,066	335,270	385,948	690,040	382,044	249,149	415,620	414,816	290,648	877,070	324,690	637,591	200,581	349,331
2011	271,687	163,081	287,312	424,984	271,432	228,997	273,393	257,510	117,772	680,338	159,164	540,665	106,386	122,109
2014	193,886	153,735	191,331	345,279	222,090	171,510	185,320	168,808	70,067	376,573	92,498	456,508	75,660	112,405
2017	55,399	72,069	94,085	101,092	70,125	140,630	83,719	119,252	42,539	125,921	45,427	386,832	26,517	46,391

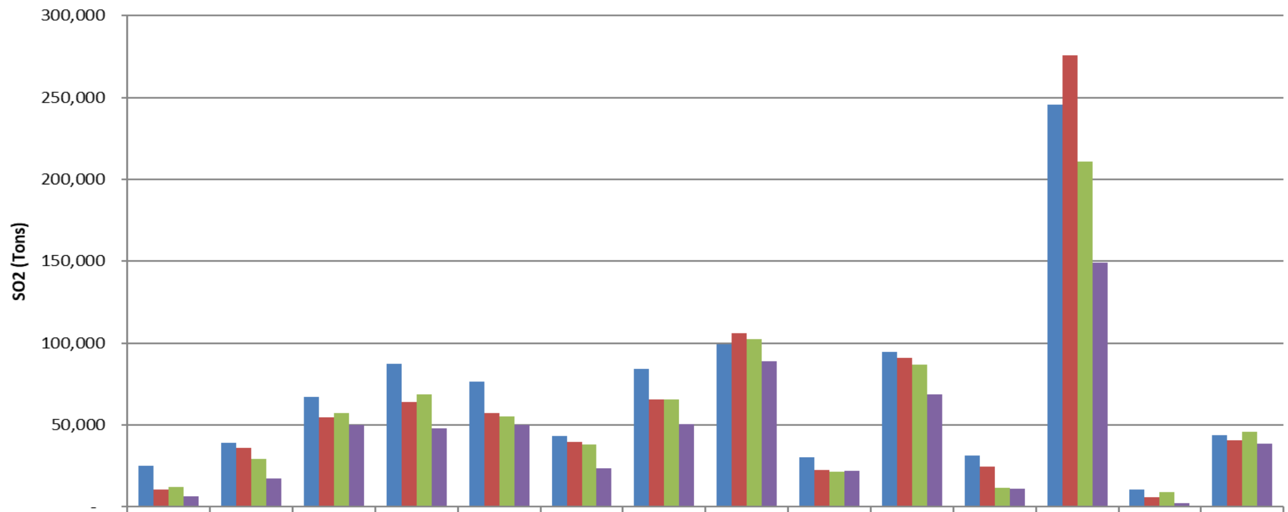
Figures 5-18 and 5-19, respectively, show 2016 through 2019 SO_2 emissions for AMPD sources in the MANE-VU states and in the "Ask states." AMPD SO_2 emissions in 2019 are lower than the corresponding 2016 emissions for almost every MANE-VU and "Ask state." However, a few MANE-VU and "Ask states" show slight increases in AMPD SO_2 emissions between 2016 and 2017. Despite the handful of state increases, total AMPD SO_2 emissions for 2017 are well below the corresponding 2016 total for both the MANE-VU states and the "Ask states." For applicable states, some of the SO_2 reduction for AMPD sources is attributable to CSAPR (replaced CAIR), which requires NO_X and/or SO_2 emissions reductions from EGUs in 27 states in the eastern and central US.

Figure 5-18: MANE-VU State SO_2 Emissions from AMPD Sources, 2016–2019 (tpy)



	CT	DC	DE	MA	MD	ME	NH	NJ	NY	PA	RI	VT
2016	362	-	513	1,717	16,729	369	573	1,725	4,533	98,006	14	1
2017	421	-	545	1,083	8,087	444	473	1,722	2,561	69,790	18	1
2018	690	-	644	742	11,325	643	1,197	1,433	4,889	69,018	22	1
2019	132	-	279	194	5,572	50	417	1,250	1,972	52,394	16	1

Figure 5-19: "Ask State" SO_2 Emissions from AMPD Sources, 2016–2019 (tpy)

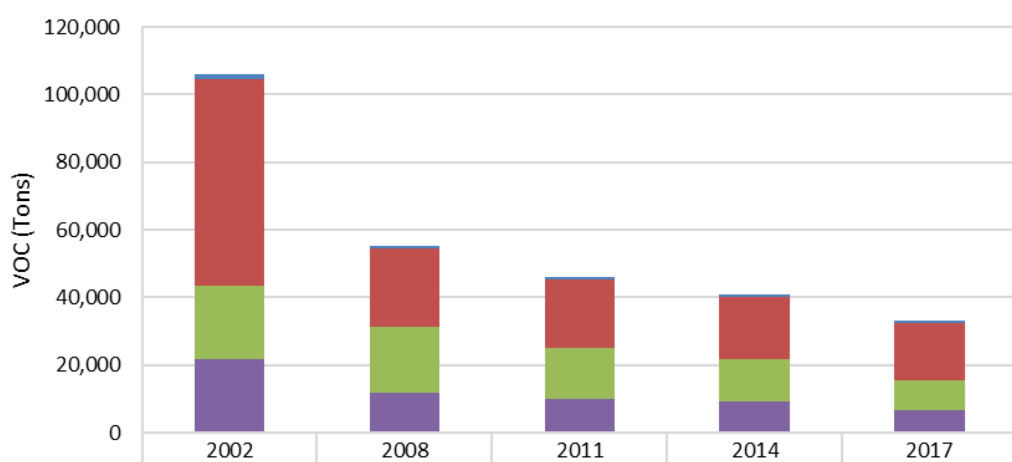


	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2016	25,034	39,186	66,993	87,083	76,424	43,328	84,019	99,451	30,136	94,486	31,270	245,799	10,316	43,693
2017	10,478	35,700	54,511	63,735	57,119	39,699	65,369	105,993	22,265	90,751	24,312	275,993	5,791	40,545
2018	12,023	29,202	57,357	68,509	55,161	38,175	65,504	102,607	21,522	86,570	11,735	211,025	8,875	45,778
2019	6,420	17,075	50,137	47,780	49,949	23,688	50,554	88,916	21,978	68,905	11,224	149,135	2,343	38,741

5.4.6 Volatile Organic Compounds

Figure 5-20 shows VOC emissions from all data categories in New Hampshire over the 2002 to 2017 period. In general, VOC emissions have declined during this period. However, the sharp decrease in nonpoint VOC between 2002 and subsequent years is partly due to a revised methodology for residential wood combustion. Therefore, the decrease in nonpoint VOC between 2002 and subsequent years is artificially overstated.

Figure 5-20: VOC Emissions from all Data Categories in New Hampshire, 2002 – 2017 (tpy)

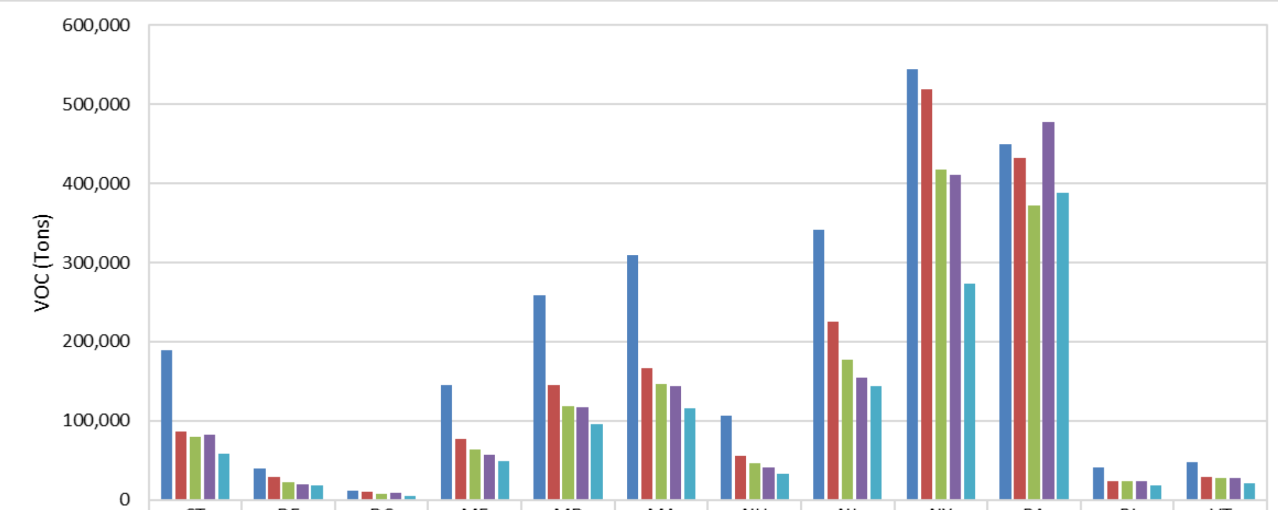


	2002	2008	2011	2014	2017
Point	1,689	783	652	441	757
Nonpoint	60,984	23,335	20,046	18,560	17,017
Nonroad	21,829	19,415	15,094	12,598	8,510
Onroad	21,682	11,811	10,092	9,168	6,804

Figure 5-21 shows total VOC emissions from all data categories for the MANE-VU states during the period from 2002 to 2017. Except for CT, PA, and RI, VOC emissions have declined in all MANE-VU states during this period. Similar to New Hampshire, the decrease between 2002 and subsequent years is likely artificially overstated for many states because of changes in estimation methodologies for nonpoint categories such as residential wood combustion and yard waste burning.

Much of the decrease in VOC is attributable to Federal and state rules for evaporative sources of VOC emissions such as portable fuel containers; architectural, industrial, and maintenance coatings; consumer products; and solvent degreasing. Many states rules for these types of categories are based on the OTC Model Rules. Evaporative VOC emissions from these types of sources are expected to continue to decline as more states adopt rules based on the OTC Model Rules. Other decreases are due to states' VOC RACT rules. Evaporative VOC emissions from on-road mobile sources have decreased due to state motor vehicle inspection and maintenance programs and the permeation of more Onboard Refueling Vapor Recovery equipped vehicles into the fleet. VOC emissions from non-road and on-road mobile sources are expected to continue to decrease as older, more polluting vehicles are replaced by newer, cleaner ones.

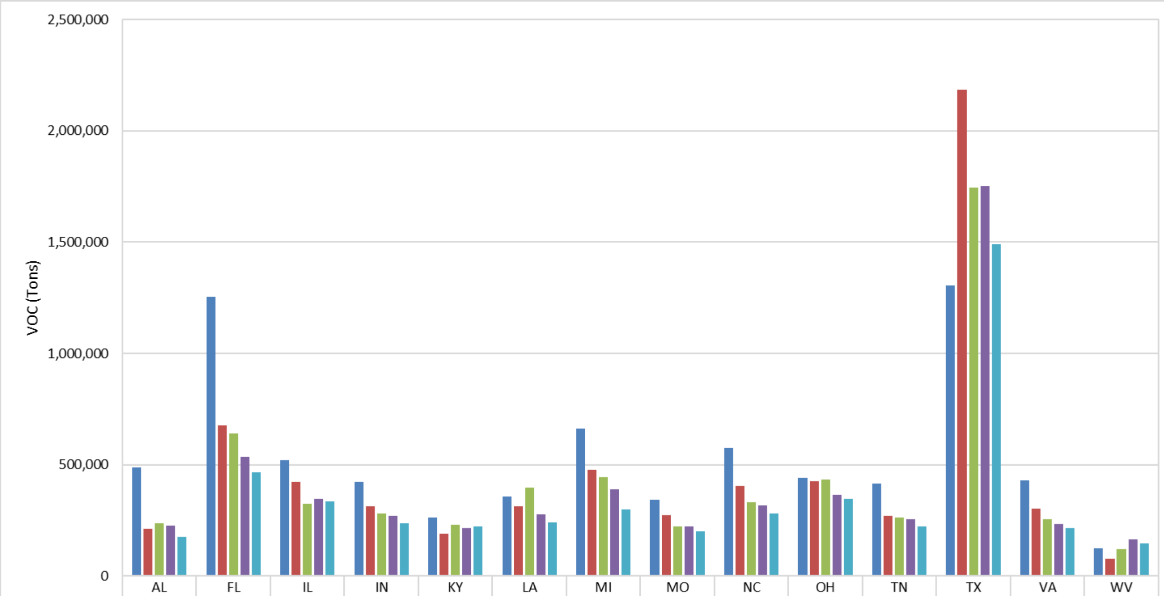
Figure 5-21: Total VOC Emissions from all Data Categories in the MANE-VU States, 2002 – 2017 (tpy)



	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT
2002	189,223	38,921	11,388	145,157	259,266	309,210	106,185	341,276	544,016	449,637	41,448	47,157
2008	86,024	28,705	10,467	76,423	145,138	166,086	55,344	224,688	519,566	432,590	23,770	29,131
2011	79,809	22,830	7,950	64,086	118,309	146,068	45,884	177,043	416,915	372,135	23,186	27,869
2014	82,350	20,153	8,939	57,527	116,512	144,016	40,767	154,589	410,573	477,338	23,499	27,366
2017	58,059	18,682	5,165	48,454	95,087	116,269	33,088	143,384	273,152	388,427	17,965	20,922

VOC emissions from all data categories from the "Ask states" are shown in Figure 5-22. In general, VOC emissions have declined in the "Ask states," although some states show little change, or even increases, in total VOC emissions from 2002 to 2014/2017. Some of these increases, or the sharp decreases evident in AL and FL between 2002 and subsequent years, could be artificial due to methodology changes. Despite the increases in some individual states, overall total VOC emissions in the "Ask states" have declined from 2002 to 2017.

Figure 5-22: Total VOC Emissions from all Data Categories in the "Ask States", 2002 – 2017 (tpy)



	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2002	488,790	1,254,948	518,945	421,835	262,126	356,148	660,704	344,183	574,306	441,791	413,803	1,306,082	430,319	124,621
2008	210,676	676,019	422,491	314,899	189,340	313,255	478,335	274,335	405,366	425,224	270,776	2,185,097	301,131	77,182
2011	235,609	639,752	324,726	279,108	231,570	395,575	443,805	223,847	330,121	433,846	262,588	1,743,762	256,981	119,437
2014	227,680	534,554	346,254	268,058	215,759	275,798	388,431	222,869	318,555	363,164	255,189	1,752,968	234,222	165,676
2017	175,055	464,332	333,684	235,470	220,905	241,418	297,891	201,573	281,519	347,773	221,151	1,490,387	216,691	146,312

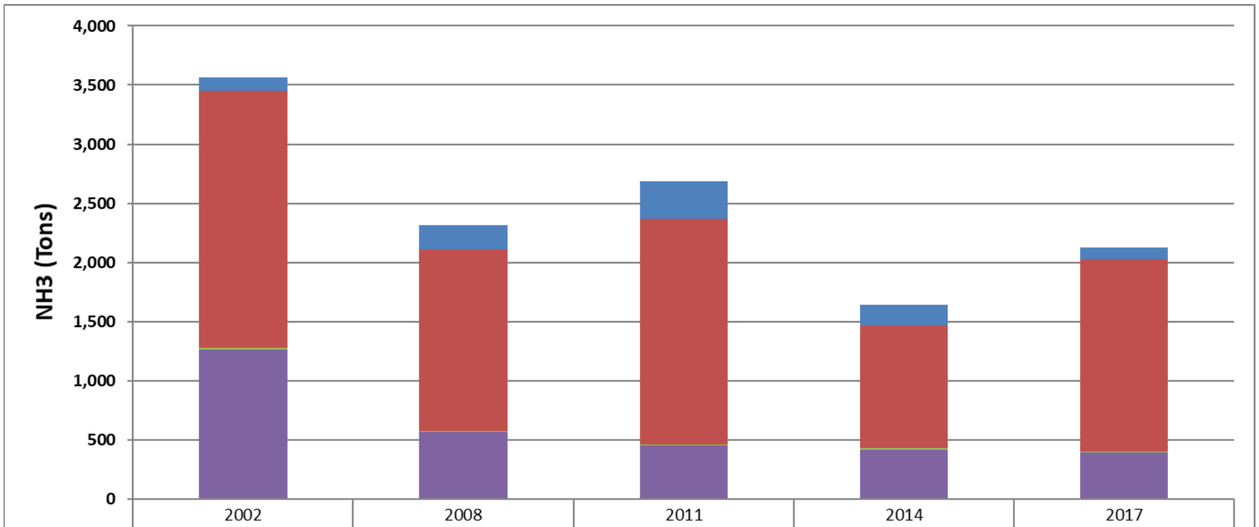
5.4.7 Ammonia

Figure 5-23 shows ammonia emissions for all data categories in New Hampshire for 2002 to 2017. Although some year to year variability can be seen, there is still a general downward trend in ammonia emissions for New Hampshire. This is particularly true when comparing 2014 with earlier years.

Figure 5-24 shows total ammonia emissions for all data categories combined for the MANE-VU states. Similar to New Hampshire, some year-to-year variability can be seen. For many MANE-VU states, ammonia emissions for 2014 and 2017 are lower than they were for earlier years. Most MANE-VU states saw increases in 2017 relative to 2014; this could be the result of estimation methodology changes.

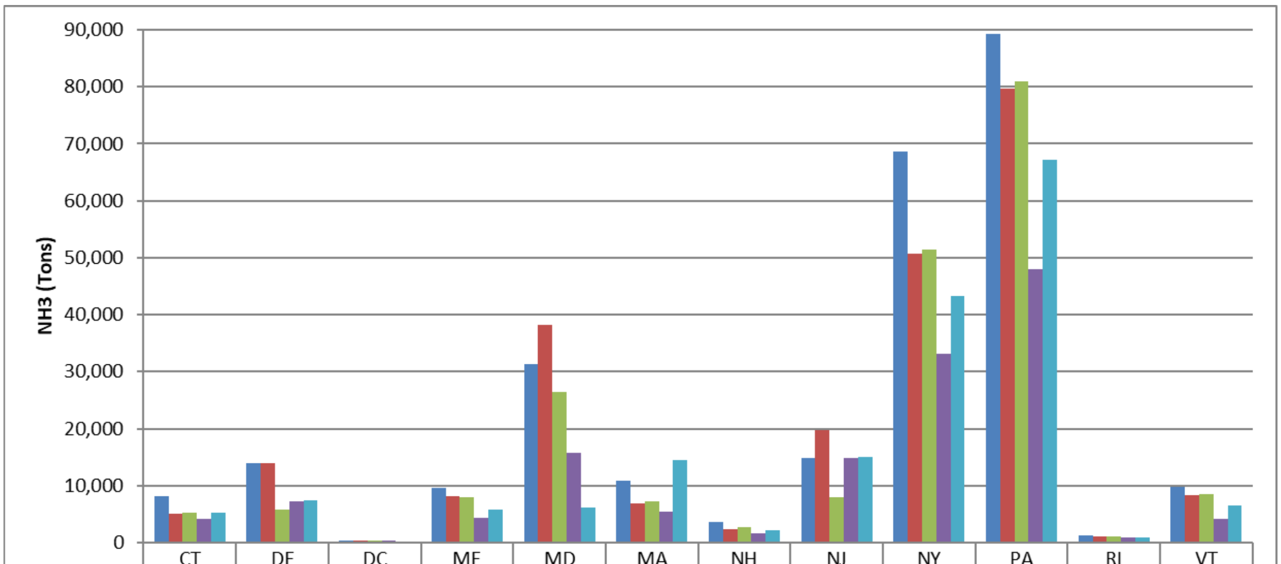
Total ammonia emissions for all data categories for the "Ask states" are shown in Figure 5-25. Again, some year-to-year variability in ammonia emissions can be seen. In most of the "Ask states," 2014 emissions are lower than they were for previous years. For every "Ask state," 2014 emissions are lower than they were for at least one of the earlier years. 2017 saw an uptick in ammonia emissions for some of the "Ask states;" again, this could be due to changes in emissions estimation methods.

Figure 5-23: NH_3 Emissions in New Hampshire from all Data Categories, 2002 - 2017 (tpy)



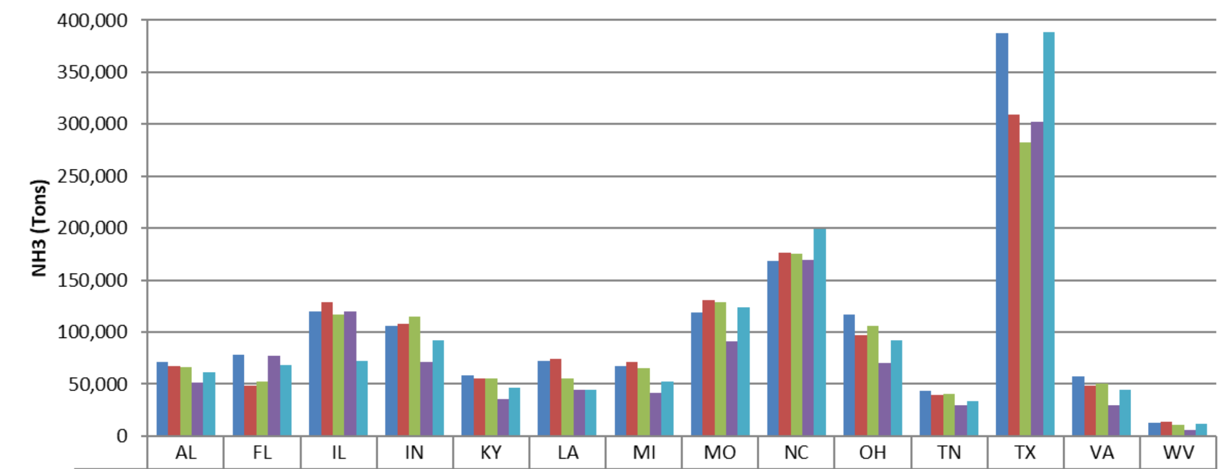
	2002	2008	2011	2014	2017
Point	114	200	316	178	93
Nonpoint	2,178	1,538	1,905	1,038	1,628
Nonroad	9	10	10	11	10
Onroad	1,266	563	452	417	391

Figure 5-24: Total NH_3 Emissions in the MANE-VU States from all Data Categories, 2002 - 2017 (tpy)



	CT	DE	DC	ME	MD	MA	NH	NJ	NY	PA	RI	VT
2002	8,194	13,920	421	9,557	31,278	10,794	3,567	14,807	68,536	89,263	1,202	9,810
2008	4,989	13,975	354	8,207	38,288	6,929	2,311	19,804	50,737	79,588	1,092	8,379
2011	5,200	5,771	330	8,024	26,429	7,177	2,684	8,049	51,487	80,871	1,075	8,567
2014	4,194	7,252	317	4,356	15,746	5,411	1,645	14,895	33,110	48,000	862	4,148
2017	5,296	7,353	263	5,765	6,108	14,492	2,122	14,976	43,180	67,183	873	6,490

Figure 5-25: Total NH_3 Emissions in the "Ask States" from all Data Categories, 2002 - 2017 (tons)



	AL	FL	IL	IN	KY	LA	MI	MO	NC	OH	TN	TX	VA	WV
2002	71,627	77,959	120,222	106,354	58,406	72,094	66,954	119,101	168,398	117,152	43,831	387,228	57,150	12,832
2008	67,454	48,211	128,348	108,301	55,558	74,188	71,406	131,113	176,143	96,512	39,213	309,529	48,462	14,100
2011	66,494	52,218	117,209	115,038	55,265	55,272	65,507	128,753	175,127	105,793	40,364	282,413	49,935	10,668
2014	51,329	77,637	119,481	71,036	35,476	44,703	41,500	90,853	169,777	69,854	29,237	301,772	29,151	6,162
2017	61,153	68,283	71,951	92,297	46,390	44,395	52,261	124,221	199,395	92,404	33,574	388,408	44,768	11,815

5.5 Assessment of Anthropogenic Sources that Have Impeded Progress

40 CFR §51.308(g)(5) requires an assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred since the period addressed in the most recent plan required under paragraph (f) of this section including whether or not these changes in anthropogenic emissions were anticipated in that most recent plan and whether they have limited or impeded progress in reducing pollutant emissions and improving visibility.

40 CFR §51.308(g) does not specifically define what would constitute a significant change in emissions that would limit or impede progress in reducing pollutant emissions or improving visibility. There are no new sources or existing sources in New Hampshire that have significantly increased emissions of haze-causing pollutants. Further, in New Hampshire and upwind states, there has been a shift to cleaner generation of electricity using natural gas in place of dirtier fuels such as coal or oil. This trend is driven by economics and the availability of less expensive natural gas supplies rather than by any regulatory mechanism. It is not known if this economic situation will continue into the future, therefore MANE-VU states are pursuing Item 4 of the current Intra-RPO "Ask" (i.e. the enforceable "locking-in" of the emission rates associated with the burning of cleaner fuels, see Sections 4.2.4 and 4.2.8).

6 MONITORING STRATEGY

According to 40 CFR §51.308(f)(6), in their periodic comprehensive revisions, states must identify their strategy for measuring, characterizing, and reporting regional haze visibility impairment that is representative of the Federal Class I areas within their states. Compliance with this requirement may be met through participation in the IMPROVE network. The IMPROVE program provides scientific documentation of the visual air quality of America's Federal wilderness areas and national parks.

The IMPROVE program consists of monitoring sites operated and maintained through a formal cooperative relationship between the EPA, National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management and U.S. Forest Service. Several other organizations have joined the program since its inception in the mid-1980s. These are State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (which have since merged under the name National Association of Clean Air Agencies or NACAA), Western States Air Resources Council (WSARC), MARAMA, and NESCAUM.

New Hampshire's monitoring strategy relies on participation in the IMPROVE network and FED. NHDES evaluates the monitoring network periodically and makes appropriate adjustments to it as necessary. However, New Hampshire's commitment to following this strategy and providing continuing assessments of progress toward national visibility goals at mandatory Federal Class I areas will remain contingent on sufficient federal funding in support of monitoring program requirements and associated databases. In the event that existing funding sources are eliminated or curtailed, New Hampshire will consult with the FLM on the most practicable course of action. Other implementation plan requirements related to the monitoring strategy are addressed in the following sections.

6.1 Additional Requirements Related to Monitoring

- **40 CFR §51.308(f)(6)(i)** *The establishment of any additional monitoring sites or equipment to assess whether reasonable progress goals are being achieved.*

  At this time, the existing monitors are sufficient to make this assessment. New Hampshire's commitment to maintain the current level of monitoring, and to expand monitoring or analysis should such action become necessary, will remain contingent on federal funding assistance.

- **40 CFR §51.308(f)(6)(ii)** *Procedures by which monitoring data and other information are used in determining contributions to regional haze visibility impairments to Class I Federal areas both within and outside of the State.*

  In order to determine which states should be consulted an analysis must be conducted to define what states, sources, or sectors reasonably contribute to visibility impairment. EPA's 2019 Guidance document calls for a process for determining which sources or source sectors should be considered. The procedures that NHDES used to make this determination were described earlier in Section 3.2.1.

- **40 CFR §51.308(f)(6)(iv)** *Provide for the reporting of all visibility monitoring data to the Administrator at least annually for Class I Federal areas within the State.*

  The FLM submits the data, and the data are posted on the FED website.

- **40 CFR §51.308(f)(6)(v)** *Provide a statewide inventory of emissions of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in mandatory Class I areas within New Hampshire.*

  In Section 5.4, NHDES has provided statewide emissions estimates of NO_X, SO_2, $PM_{2.5}$, VOCs, and NH_3 for most recent year for which data are available (2014 for all categories and 2017 for those facilities that report to EPA's AMPD) NHDES commits to update its statewide emissions inventory periodically.

- **40 CFR §51.308(f)(6)(vi)** *requires that SIPs provide other elements, including reporting, recordkeeping, and other measures necessary to assess and report on visibility.*

  While NHDES believes the current IMPROVE network is sufficient to adequately measure and report progress toward the regional haze goals set for New Hampshire's and other Federal Class I areas, NHDES in the past has found additional monitoring information to be useful in assessing patterns of regional visibility and fine particle pollution. Examples of these data sources include:

  - The NESCAUM RAIN network, which provides continuous, speciated information on rural aerosol characteristics and visibility parameters.
  - The EPA Clean Air Status and Trends Network (CASTNET) program, which has provided complementary rural fine particle speciation data at non-Class I sites.
  - The EPA Speciation Trends Network (STN), which provides speciated, urban fine particle data to help develop a comprehensive picture of local and regional sources.
  - State-operated rural and urban speciation sites using IMPROVE or STN methods (the latter program comprising 54 monitoring stations located mainly in or near larger metropolitan areas).
  - The Supersites program, which has undertaken special studies to expand knowledge of the processes that control fine particle formation and transport in the region.

Assuming that these resources will continue to be available and that fiscal reality allows, New Hampshire will continue using these and other data sources for the purposes of understanding visibility impairment and documenting progress toward national visibility goals for Federal Class I areas under the Regional Haze Rule. New Hampshire's IMPROVE monitoring site representing Great Gulf and the Presidential Range / Dry River Wilderness Areas is located in Green's Grant is pictured below in Figure 6-1.

Figure 6-1: Camp Dodge IMPROVE Monitoring Station, AQS ID 33-007-4002

7 ADMINISTRATIVE MATERIALS

New Hampshire held two public comment periods and one hearing related to this Regional Haze SIP Revision:

- On November 4, 2019, NHDES published a notice in the Manchester, NH, *Union Leader* announcing a 30-day public comment period providing for submission of written comments and allowing any member of the public the opportunity to request a public hearing on the SIP revision.
- A second public notice period was conducted starting on December 10, 2021 and extended on December 27, 2021 with published notices in the *Union Leader*. A public hearing was held in Room 208C at NHDES Offices in Concord, NH and online via WebEx at 1:30 p.m. on February 23, 2022.

Copies of the public notices, documentation certifying the public process and evidence of legal authority to create these SIP revisions are included in Appendix Y.

A 60-day comment period was also offered for EPA and FLMs and comments were received and incorporated into the Appendix. Responses to comments are included in Appendix W to this SIP and any appropriate or necessary changes to the SIP were made based upon acceptable and meaningful public comments.

8 CONCLUSION

This SIP update represents the culmination of years of technical work performed in partnership with member states, tribes, stakeholders, EPA and the FLM. Much of the technical work and consultation for this update started earlier than states in other regions in order to capitalize on technical tools, including the 2011-based photochemical modeling platform, already developed in recognition that additional funding is not expected to be available to redo it.

It is important to note that concerns raised about using the latest emissions inventory can be put into a perspective that it is not a critical factor during this SIP update. Currently, Federal Class I areas in the MANE-VU region are monitoring visibility improvement in excess of the rate of progress requirements for 2018 and most are also already monitoring benefits in excess of the 2028 rate of progress requirements. Therefore, the emissions inventories used for photochemical modeling are not likely to determine that additional measures will be required to meet rate of progress goals. Instead, the primary direction of this SIP update is to consider another provision of the Regional Haze Rule, the determination of other measures that can improve visibility that can be reasonably implemented during this 10-year planning cycle. Photochemical modeling based on the 2011 NEI was not used to determine how reasonable those measures are, but rather to demonstrate the benefit that may occur if those additional measures are implemented. If an emission source has updated its operations and reduced emissions, then that would be considered during the requested analysis prior to SIP inclusion.

It is noteworthy that the additional measures included in the MANE-VU "Asks" and this SIP update were selected because they were already analyzed and implemented by at least one-member state. Thus, in application, they were found to be reasonable. After further examination by the MANE-VU TSC, MANE-VU states agreed that the measures are reasonable to pursue at this time to benefit visibility at MANE-VU Class I areas. The measures are expected to benefit Federal Class I areas outside the MANE-VU region as well.

Because New Hampshire finds the measures included in this SIP to be reasonable to pursue at this time, they are included in this SIP update along with appropriate technical analysis, rulemaking and public review. As a result, New Hampshire expects visibility at its two Federal Class I areas, and nearby Federal Class I areas that New Hampshire emissions might affect, to continue to improve over the next 10 years. Further, because most visibility impairing pollutants are small particles, further reducing their concentrations is expected to produce incremental public health benefits.